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THE RECENT PROGRESS OF ENDOSCOPIC METHODS AS APPLIED TO THE LARYNX, TRACHEA, BRONCHI, ESOPHAGUS AND STOMACH.*

DR. CHEVALIER JACKSON, PITTSBURGH, PA.

Killian, the father of bronchoscopy, three years ago wrote: "A vast amount of material has accumulated which must be tested, observed and arranged." If I shall fail, as doubtless I shall, to report the extent to which this material has been tested, I can but point to the next sentence by the same great master: "Day by day this scientific data increases so that soon it will be difficult to keep pace with it. Knowing the enormousness of the task and my inability to fulfill it, as well as to prevent overlapping, it was thought best to leave to my co-reporter, Prof. Killian, the difficult task of reviewing the recent European progress of endoscopy. To report all, even of American recent endoscopic progress, would be impossible in the present limits of time and space.

Who shall do endoscopy of the larynx, tracheo-bronchial tree, esophagus and stomach: For the purpose of collecting statistics, I sent out circular letters of inquiry to 380 laryngologists in America. I did not include European workers because my distinguished co-referee, Prof. Killian, will report to you the European progress in endoscopy. The majority of the 380 were examining the larynx

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by direct laryngoscopy, but only seventy-nine of them had attempted bronchoscopic or esophagoscopy foreign body work. Only thirty-five of the laryngologists cared to do this work, stating that they believed it should be referred to a few men. The views of many are well expressed in the following letter from Dr. Derrick T. Vail: "I have referred such cases to those who are equipped for the work. I think this is a specialty within the specialty which is better followed by one or two men in such a community as this (Cincinnati) rather than by all." One man had spent three months in a European clinic studying, among other things, edoscopic technic. After coming home, he made the serious error of not doing any tube work at all for over a year, had no trained assistant or nurse and a numerically insufficient armamentarium, which he brought home with him. He concludes his letter thus: "I have only had two cases, both esophagoscopy for coins near the cricoid. Both patients died on the table. I shall never do another esophagoscopy, because I do not see a sufficient number of cases to do good work." The emergency character of many cases demands that each large city shall have at least one man properly trained and equipped for any sort of peroral endoscopy; but every laryngologist should be able to examine the larynx of every child by the direct method without any anesthesia, general or local, because the direct method is the only way in which the very young child's larynx can be examined, and it is but a platitude to say that a laryngologist must be able to examine the larynx. When it comes to endoscopy of the tracheo-bronchial tree, to do the work promptly, skillfully and safely, and always through the mouth, requires not only the facile hands, but, like the best modern surgery, a trained organization which shall have such constant training as to do its work well. More than this, in tracheo-bronchoscopy, unique in the whole realm of surgery, promptness and precision often makes the difference between the life or the death of the patient. There must be no failure at a critical moment upon the part of any factor (person, instrument or apparatus) in the organization. It is such failure that makes the wide difference between the percentage of mortality shown in the statistics of the work of the occasional operator and of the large clinics. In esophagoscopy the same holds true in regard to foreign-body work, where lack of skill may cause dangerous dyspnea, which, with lack of promptness and precision, may prove fatal. In the diagnosis and treatment of disease, the same degree of skill is necessary for safe introduction and promptness and precision are necessary in order that esophagoscopy for diagnosis will be advised as a

simple and minor procedure of slight discomfort to be resorted to on the slightest indication. In no other way can esophagoscopy accomplish its full measure of usefulness in the diagnosis and treatment of esophageal disease, and especially of pre-cancerous diseases such as leucoplakia, abdominal and hiatal esophagismus, stasis, erosion, ulceration, and also in the early detection of malignancy.

Radiography in its relations to peroral endoscopy: Excellent progress has been made in the radiographic localization of foreign

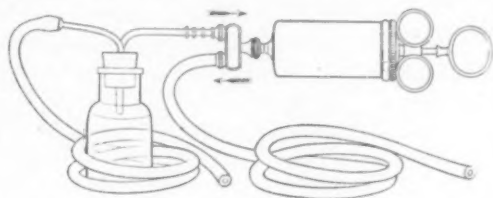


Figure 1. Aspirator for esophagoscopy with additional tube connected with the plus pressure side for use in case of occlusion of the esophageal drainage tube.

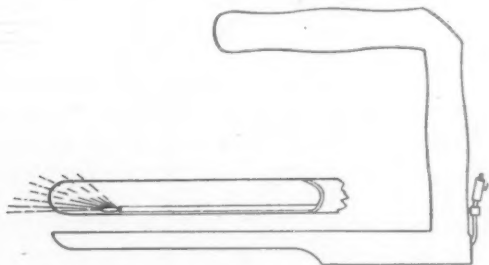


Figure 2. Esophageal speculum for foreign body work and for operations upon the upper end of the esophagus.

bodies. This is especially true in regard to the technical improvements which have rendered possible the practically instantaneous radiography, as it has quite recently been recognized (Tilley and others) that an instantaneous radiograph will often show foreign bodies not visible with longer exposures. A deep inspiration held during the exposure creates an artificial emphysema which causes the foreign body to show, because it lessens the density of the thorax; though it must be borne in mind that the more horizontal position of the ribs and the displacement of the viscera, including the foreign body, must be allowed for in the localization. The steady

progress made by the radiographer in lateral radiography of the thorax has not only been of great aid in the general localization from bony and visceral landmarks, but also in conjunction with the caliper-guide suggested by Dr. Boyce and perfected by the author. In conjunction with the lateral radiograph the caliper-guide will bring the point of the bronchoscope in close relation with the foreign body, thereby greatly diminishing the number of small bronchial tubes to be searched; this method being used, of course, only in case of small foreign bodies which have fallen into a very small bronchus far down or far out near the periphery of the lungs. The lateral placement of the point of the bronchoscope depends upon a mark placed on the skin by the radiographer who determines the point by an antero-posterior radiograph. Another aid in this same class of difficult cases has been used by the author. A positive transparent film of the tracheo-bronchial tree is laid over the negative of the patient showing the foreign body, when the foreign body will show through the transparent tracheo-bronchial tree of the overlying positive film. In placing the film, bony landmarks are not reliable and visceral landmarks are necessary. The two important visceral landmarks are the dome of the pleura and the dome of the diaphragm. It is needless to say the tracheo-bronchial tree necessarily lies in the body of the lung between these two landmarks, and lines corresponding to these are placed on the film. Twelve photographic enlargements and reductions are on hand so that a film of the size (rather than age) is available for any sized patient. All this work is done, of course, in a darkened room, with a strongly illuminated shadow-box; and in the event of the foreign body showing very faintly on the radiograph of the patient, it is strengthened by an ink-mark on the uncoated side of the negative, which can be readily erased afterwards if desired. One source of error, of course, is that the positives of the tracheo-bronchial tree are made from the tracheo-bronchial tree of a cadaver, whereas bronchoscopic study of the tree shows that it is not quite in the same position in the living. I have found the injection preparations of Bruenings to come nearer those of the living tree than any other that I have been able to find, and therefore I have used them in making the positive films. It is customary in the interpretation of a radiograph, when one lung shows dark and the other light, to consider that the dark side contains the foreign body which has occluded the main bronchus with perhaps compensatory emphysema on the opposite side. Iglaue reports a very interesting case where this reading was erroneous because the

foreign body had, by a valve-like action, imprisoned more air in the obstructed side, so that there was a very marked emphysema shown by the radiograph on the obstructed side. The negative report from the radiographer remains to-day as it always has been, unreliable, because many bodies are not opaque to the ray, and, moreover, the foreign body may not be the same as that of which we get a history. In addition to this, even metallic bodies at times do not show. For instance, in one of the author's cases, that of an enormous woman of 53, expert radiographers, for a period of two years, made quite a number of exposures, but were unable to demonstrate a tack which they finally demonstrated to be present, and which the author removed. Such occurrences will doubtless be less and less frequent because of the steady advance in the technical perfection of radiography. A number of recent cases have made

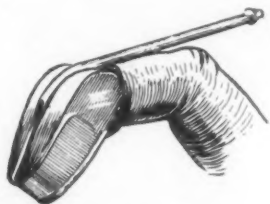


Figure 2. Thimble bite block originally suggested by Boyce and improved by McKee and McCready. Ether is insufflated through the tube, if needed, for esophagoscopy. The tube on the bite block is not used in bronchoscopy.

it quite clear that it is necessary to do a bronchoscopy if there is any reason to expect from the history that there is a foreign body located somewhere in the air-passages or the esophagus, notwithstanding a negative ray finding and a total absence of symptoms, for it is remarkable how tolerant the trachea, bronchi and the esophagus become to the presence of foreign bodies after the initial symptoms immediately following the accident have subsided. Radiography has been of great aid in the study of diseases of the esophagus, but it has been clearly demonstrated that they are apt to be quite misleading if taken alone without endoscopy. For instance, one case sent to the author for the removal of a diverticulum, was found not to be a diverticulum at all, but an enormous dilatation of the entire esophagus due to an abdominal esophagismus. This dilatation was filled with food so that when the bismuth porridge was swallowed it simply lodged on top of the mass of food. The food did not throw a shadow, but the porridge did in a mass

closely resembling a diverticulum. On introduction of the esophagoscope, nearly two quarts of stale food was removed. Furthermore, to attempt to make a diagnosis and treat diseases of the esophagus on the ray findings alone, or supplemented with laboratory and blind methods is to ignore the greatest of recent progress in the treatment of diseases of the esophagus. It is not enough to



Figure 4. Showing the best position of the operator, patient and assistant for direct laryngoscopy on adult patients under local anesthesia. The sitting position of the operator renders laryngeal exposure easy for patient and operator; whereas the usual standing position of the operator throws the patient into a posture that renders laryngeal exposure difficult as well as throwing the trachea out of line. The assistant's right index-finger is used for counter-pressure either backward or laterally, as needed.

know that there is a diverticulum, a dilatation or a spastic stenosis. To do effective work, it is necessary to know the condition of the mucosa and especially the lesions in the abdominal esophagus, and the cardial portion of the stomach. There is absolutely no way of knowing these without the esophagoscope.

Instruments: Quite a number of new forms of illumination and new tubes have been devised, and they practically all have done good service in the hands of skillful men. In the statistics which the author gathered, there was practically no difference either in the mortality or the percentage of successful removals of foreign bodies between the different kinds of tubes and illumination. Far more depended on the individual skill of the operator. Doubtless the best instrument for each operator is the one with which he has

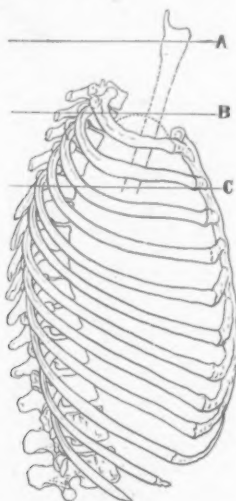


Figure 5. Schematic illustration of normal position of the intra-thoracic trachea, and also of the entire trachea when the patient is in the correct position for peroral bronchoscopy, such as the original Kirstein position, or that shown in Figure 3. When the head is thrown backward (as in the usual or in the Rose position) the anterior convexity of the cervical spine is transmitted to the trachea of which the axis is no longer straight.

practiced most. Efforts to produce jointed and angular esophagoscopes and gastroscopes continue, and all such should be encouraged (provided great care is exercised) because all effort results in increased attention to the esophagus and its diseases. There is absolutely no hope that any esophageal instrument will ever be devised that will be safe unless carefully used, because even the soft rubber stomach tube has been known to cause fatal perforation. One of the most successful of the angular esophagoscopes is the indirect one of Lewisohn. I saw it passed upon a patient with practically no discomfort and the view was good. In its present

form it is, of course, adapted to simple inspection, not for the removal of foreign bodies or specimens, nor for probing or palpation, wiping or medication. For dealing with foreign bodies and disease high up in the esophagus, the author has found exceedingly useful, an elongation of his laryngeal speculum. This instrument is 25 cm. long for use in adults, and with it there is very much less risk of overriding foreign bodies in the high situation than with the esophagoscope. This esophageal speculum has also been found particularly useful for the breaking up of those rare congenital webs first described by Mosher and Clark, and of the high strictures of the esophagus which result from decubitus ulcers resulting from the mixed infections complicating enteric fever, scarlatina, diphtheria and like conditions and the breaking down of gummata. These webs and strictures yield quite readily to the breaking up and stretching with this speculum. Some few forms of cicatricial stenoses, especially those following the breaking down of gummata, have a tendency to recur and it is necessary to repeat the treatment frequently, but in most of the conditions, a very few treatments are sufficient, a divulser being only occasionally required. Yankauer has perfected an aspirator for the removal of secretions operated by a small exhaust fan in connection with an electric motor. He has also used a jet of compressed air blowing sidewise across the proximal tube-mouth to blow away the secretions coughed out by the patient to prevent them soiling the mirror of the Bruenings lamp or Kirstein head-light. It certainly is a comfort to see the stream of coughed-up secretion being projected off sidewise instead of getting it in one's face. Ingals uses an electric aspirating pump originally devised for massage of the ear. A number of endoscopists are using various forms of aspirators attached to a water faucet. In using this, it is necessary to exercise precaution if commercial circuits are used for illumination, lest the current be "grounded" through the water pipes, especially when withdrawing long aspirating tubes. The author prefers, for esophagoscopy, an aspirator in the wall of the esophagoscope or gastroscope, the exhaust being by an aspirating syringe. The positive pressure side of the syringe also has a soft rubber tube, and in case the aspirating canal in the wall of the esophagoscope becomes obstructed, a change of the soft rubber tube from the negative pressure to the positive pressure will force out any clots or other obstructions which may have entered the canal. The author does not use any form of aspirator, either in the wall of the tube or otherwise in the bronchoscope. He has found that the best of all ways to remove abundant secretions and blood dur-

ing bronchoscopy is to insert a large swab on the usual long Coolidge sponge-carrier, pushing it down until the large gauze sponge goes beyond the distal end of the bronchoscope. Then the patient will cough the bronchoscope full of the fluid, and the withdrawal of the carrier and swab will pull up often as much as an entire

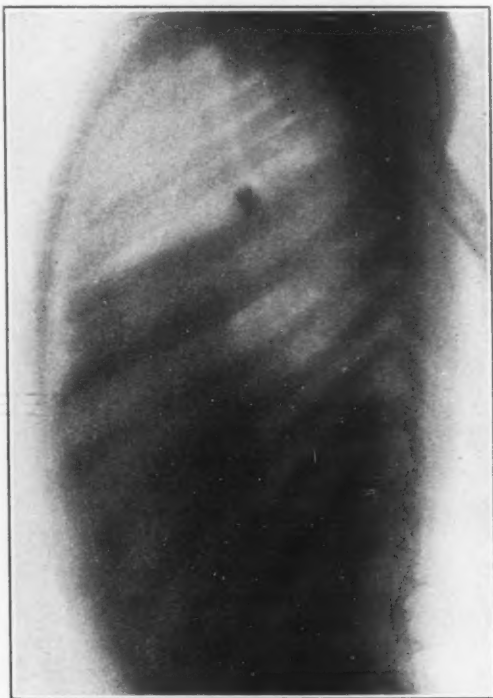


Figure 6. Lateral radiograph (by Dr. George C. Johnston) of a child of 4 years, showing the normal direction of the trachea. A pale streak is seen extending backward as well as downward, ending at the foreign body in the right bronchus. There is a narrowing of this streak at the bifurcation, representing a flattening from before backwards. Compare schema, Figure 5.

tube full of secretions at a time, just as the water above the plunger of an ordinary pump will lift the water which is above the plunger. This is one of the advantages in working under slight anesthesia or none at all. Contrary to many of the statements that have appeared, the form of aspiration used by the author has absolutely nothing to do with distal illumination. There is no form of il-

lumination that will enable the operator to see through a pool of blood and secretion. How to remove the fluid in the least possible time is the study of all endoscopists and the aspirator in the wall of the esophagoscope is used because there is no interruption of the work. It is a common thing at a gastroscopy to remove a pint of fluid without any interruption. Safety-pin closers continue to be devised. The last one by Hubbard is very ingenious, and doubtless will be useful for purposes other than closing pins. As is well known, wide gagging of the mouth interferes very seriously with endoscopy. All that is necessary is to keep the patient from biting the tubes. For this purpose I have found the bite block devised by Boyce and modified by my assistant McKee of great service. The anesthetizing tube is used for insufflation of anesthesia during esophagoscopy, though it is rarely that I use general anesthesia. If bronchoscopy is used, the anesthetic is insufflated through the bronchoscope. For amputation of the cancerous and the tuberculous epiglottis, I have found most useful a very heavy snare cannula armed with No. 5 steel piano wire and fitted to the massive handles of the Peters tonsil snare. By firm downward pressure on the cannula the loop can be made completely to amputate the involved epiglottis, *en masse* as demonstrated by dissection of the removed tissues. The cannula is passed beside the laryngeal speculum, not through its lumen. Wide gagging, as pointed out by the author many years ago, prevents proper laryngeal exposure and may thus defeat efforts at bronchoscopy by forcing the mandible down on the hyoid bone. All that is needed in the way of a gag is a bite block to prevent the patient closing his jaws on the delicate tube. For this, Dr. Boyce devised the thimble bite block which has recently been modified in shape by Dr. McKee and an ether tube has been added by Dr. McCready. Ether is insufflated when needed for esophagoscopy. In bronchoscopy the insufflation is done through the bronchoscope.

Preparation of the patient: In all instances of obstructive diseases of the esophagus, it is very essential to have the patient regurgitate after taking a copious drink of water in order to make sure that dilatations or diverticula, if present, may be emptied. Diverticula can be emptied sometimes by pressure on the neck, but in any event, the presence of large quantities of food in the esophagus interferes very seriously with esophagoscopy and introduces a great element of danger if a general anesthetic be used. In all cases in which time permits it is very essential, before bronchoscopy, esophagoscopy or gastroscopy, that the patient be prepared

as for any operative procedure by a carthartic, rest in bed, and the mouth should always be thoroughly cleansed by numerous brushings of the teeth and rinsing the mouth with 30 per cent alcohol, which is the best non-toxic antiseptic. The author's early insistence upon strictly aseptic operating-room technic in all forms of peroral endoscopy, while much ridiculed at the time, has come to be recognized everywhere as quite essential in a procedure which

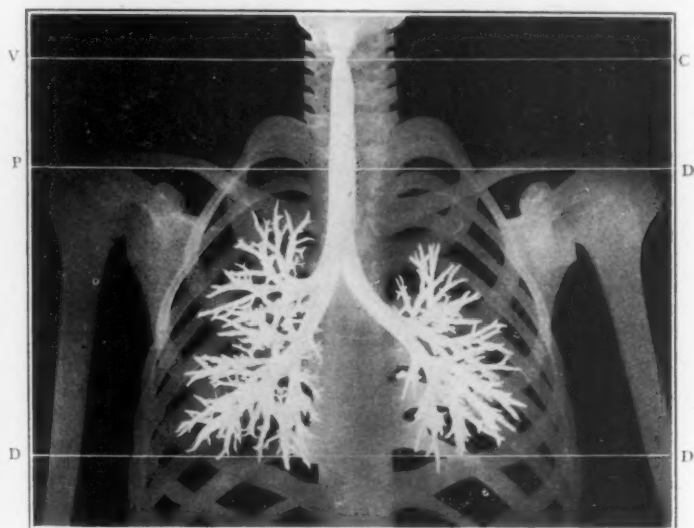


Figure 7. Illustration of a positive film used for overlaying to assist in localization of foreign bodies or lesions in the thorax. The lower white line (D-D) corresponds to the diaphragm, the middle line (P-D) to the dome of the pleura. These lines assist in placing the overlay. The upper line (V-C), corresponding to the vocal cords, is occasionally useful. Twelve photographic enlargements are on hand so that a film of the size (rather than the age) is available for any sized patient. The few minute (rather than the age) is available for any sized patient. The few minute dome.

necessarily frequently comes in contact with tuberculosis, pneumonia, diphtheria, erysipelas, and other infectious diseases. It is a matter of great gratification to the author that in fifty examinations of swabs used for wiping secretions from the bronchi, in no one instance was there found any trace of epithelial cells or of such forms of bacteria as would prove that the instruments had been in any way contaminated by contact with the mouth. This is worthy of note in connection with the obtaining of inoculation ma-

terial for the production of autogenous vaccines in cases of chronic bronchitis.

Position of the patient: For adults, the sitting position is very satisfactory for diagnosis. For infants and children, the dorsal position is better because of better control of the patient. In foreign body cases, whether adults or children, the patient should always be recumbent, never erect, because in the erect position gravity works against the operator, and the foreign body may reach a deeper point in the air-passages than it would in the recumbent position. This is particularly true of foreign bodies in the larynx and pharynx, which should never be touched unless the patient is in the Trendelenberg position. Quite a large proportion of the foreign bodies in the bronchi that have been sent in to the author, were originally in the larynx or pharynx and fell down when displaced by the attempts of the operator, who first saw the case, to remove the intruder. There seems to be quite prevalent a faulty conception of the position of the patient. The correct position for direct laryngoscopy was demonstrated by Kirstein many years ago. It consists chiefly in an extreme anterior movement of the cervical spine, with extension at the occipito-atlantal joint. In the recumbent position the anterior placing of the cervical spine means raising the head above the level of the table, as demonstrated by Boyce. To allow the head to "hang over the end of the table in the Rose position," as recommended in so many text-books, is to render endoscopy extremely difficult or impossible. Dr. Johnston has demonstrated the usefulness of flexing the head for direct laryngoscopy on the recumbent patient, putting a pillow under the patient's head, the operator standing to the left side of the patient. The Johnston position is particularly advantageous where the operator is without a regularly trained assistant with whom he is in the habit of working, because anyone can hold the head on the pillow. The position is not adapted to bronchoscopy, though Johnston used it to start the tube, and then the head of the patient is brought into the Boyce position. This requires skill and care to prevent any traumatism to the trachea in making the change. The Boyce position requires a trained assistant, and operator and assistant must work together, under which circumstances the Boyce position is ideal for bronchoscopy. I have found the Johnston position exceedingly useful in disease of the cervical spine where the children were fixed in an apparatus which I did not need to disturb to get an excellent view of the larynx. The most important point of all positions in tube work is the extreme anterior position of the

cervical spine, and for this the operator should be sitting also, if the patient is in the sitting position as shown in the photograph. The lateral position for bronchoscopy and esophagoscopy has found but little favor in America. Its only real advantage is the facility with which secretions drain from the lowermost corner of the mouth. This can be accomplished almost as well in the dorsal position with a wick of gauze hanging out over from the pharynx, the outer end the longer. If secretions are too thick to drain by capillarity, the gauze is frequently replaced by a fresh piece. An aspirating drainage tube of metal connected with the author's esophagoscopic aspirator is hooked into the lowermost portion of the patient's mouth in bronchoscopy. This rids the mouth of secretions while the patient is in the dorsal position.

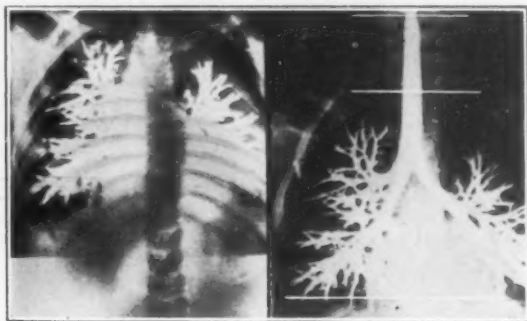


Figure 8. Illustrating a positive radiograph of the tracheo-bronchial used as a film for overlaying to assist in localization of a foreign body. The left hand illustration shows the film laid over a negative of a patient in whose left main bronchus there was a pin. Localization verified by bronchoscopy. The shadow of the pin is strengthened with ink.

Anesthesia: Davis reports the use of the intra-muscular injection of ether into the buttock of a child primarily rendered unconscious by ethylchlorid. Intra-tracheal insufflation anesthesia calls for direct laryngoscopy for the insertion of the anesthetizing tube into the trachea, especially to eliminate the possibility of laryngeal disease, as insisted upon by Elsberg. Insufflation anesthesia is used by Henry Janeway for gastroscopy, and he has done remarkable work in the insufflation of nitrous oxid and oxygen for this purpose, thereby doing away with one objection that has been raised to gastroscopy, namely, ether anesthesia. He has made some gastroscopic examinations without any anesthetic. The greatest of

recent progress in anesthesia for peroral endoscopy is toward the use of no anesthetic at all. In general anesthesia the total abolition of the cough-reflex should only be for short periods. The facile operator will do good work in many cases in spite of moderate degree of cough, and the cough can be advantageously used to rid the air-passages of secretion as elsewhere herein explained. After a short period of tubal contact in bronchoscopy, coughing lessens and often practically ceases, especially in infants without any anesthetic having been used.

In general surgery, anesthesia is required for three purposes: (1) The obtunding of pain, (really analgesia); (2) the abolition of reflexes, (relaxation); (3) for psychic effect, (mainly abolition of apprehension). For peroral endoscopy, analgesia is not required, for the pain in careful work is exceedingly slight. Anesthesia for the lessening of the reflexes is only occasionally necessary. Apprehension can be abolished or greatly diminished by the control of the patient's mental state through the personality of the operator. The degree of this control varies widely with the personal equation of the operator as well as of the patient. The operator who will make a special study of it can keep his patient free from apprehension. He will keep his patient's mind fixed on the task of breathing slowly, deeply and regularly and will get along without any anesthetic and do better work than another operator with a general anesthetic. I quite agree with Bruenings that the use of general anesthesia to overcome faults in technic is unjustifiable. The author begs to submit his personal views on anesthesia as a basis for discussion. *In children* under 6 years of age no anesthetic, general or local, should be used for direct laryngoscopy, peroral bronchoscopy or esophagoscopy except that general anesthesia may be advisable in case of very sharp foreign bodies as safety-pins or fish-hooks threatening perforation from coughing or vomiting. Even in such cases general anesthesia is absolutely contra-indicated if there is the slightest dyspnea. Cocain is needless and dangerous in children. *For adults* no anesthesia, general or local is necessary for esophagoscopy for diagnosis, or for foreign bodies, save in case of very large and sharp foreign bodies to relax the esophageal and accessory musculatures, thereby lessening the liability to local trauma from the extraction of very large foreign bodies that are sharp or rough through a spasmodically constricted lumen. The use of a general anesthetic in cases of foreign bodies in the esophagus enormously increases the danger of respiratory arrest as soon as manipulation of the foreign body is commenced. Therefore,

chloroform should never be used, though it may be added if necessary for relaxation after the stimulant effects of ether insure safety. Local anesthesia of the esophagus is needless. The esophagus is quite insensitive as anyone can demonstrate upon himself by swallowing very hot tea. After the cricoid level is passed there is no sensation. Therefore, local anesthesia, if used at all, should be limited to the laryngo-pharynx, but in most cases even this is quite unnecessary, and most patients can distinguish little difference in discomfort. For direct laryngoscopy for diagnosis, anesthesia of the larynx, including the epiglottis, is needed. It is better not to apply cocaine below this point until a primary inspection has been made, because of the altered appearances due to ischemia. For foreign bodies in adults, cocaine should not be applied with any form

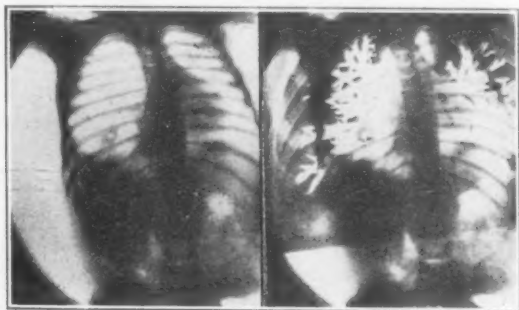


Figure 9. Illustrating on the right lung abscess (retouched). On the left the abscess is localized in the right inferior lobe bronchus by the method of overlaying. The localization coincided with the endoscopic findings when the abscess was evacuated bronchoscopically.

of applicator. A spray is much less likely to dislodge the intruder and often none at all is needed. For diagnosis and the removal of specimens or neoplasms, local anesthesia is often required. For the removal of small angiomas and edematous growths of the larynx general anesthesia may be necessary because these tumors shrink and may disappear under local anesthesia so as to render accurate work impossible. For bronchoscopy, if tracheotomy is done, whether in adults or children, it should be under local infiltration anesthesia, never, under any circumstances whatever, under general anesthesia. In the last 107 bronchoscopies and esophagoscopies for foreign bodies in children under 6 years of age, done in my clinic, no anesthetic general or local, has been used. Ten of these cases have

been in the children of physicians, every one of whom expressed his delight that no anesthetic was used, and in each instance the doctor was present at the removal of the foreign body from his own child. There is no question in the author's mind but that all forms of anesthesia, general or local, introduce a great element of danger to the handling of foreign-body cases in children, more especially when chloroform is used. In adults, with ether, the risk is probably very slight. The ordinary risks of chloroform anesthesia are enormously increased in esophagoscopy, for which chloroform is absolutely contra-indicated. Intra-tracheal insufflation anesthesia with the Elsberg apparatus is ideal for esophagoscopy.

Technic: Many interesting points in regard to technic were brought out by replies to my circular letter of inquiries. Space forbids taking these up, but one point is worthy of mention. I was very much astonished to find some men were still using a mandrin to pass an esophagoscope, and one endoscopist uses a mandrin even for passing a bronchoscope. In esophagoscopy, the tubes should always be passed by sight, lest a foreign body be overridden, or a diseased wall encountered. In bronchoscopy a mandrin is a needless encumbrance, and I believe has altogether been abandoned by bronchoscopists of large experience everywhere.

Direct laryngoscopy: Considering the fact that it is now eighteen years since Kirstein demonstrated the feasibility of examining the larynx by direct methods, and considering the developments of Killian who made it possible, and of Bruenings, Von Eicken and others, and taking into consideration also the fact that the larynx of any child can be examined in a few seconds without any anesthesia, either general or local, it is a very remarkable thing that there remains in the world any laryngologist who is to-day not availing himself of this method, but is depending upon an inferential diagnosis from the appearance of the epiglottis, for it is but seldom that we can see more than this by the indirect method in younger children. There has been a tendency, in the last few years, to question the value of direct laryngeal methods for diagnosis in adults. While it is undoubtedly true that the indirect method is of the greatest value and always will be, it is also true that in many instances diagnosis of laryngeal infiltrations is frequently cleared up by the different viewpoint obtained in direct laryngoscopy. Bruenings states that the early hopes of direct laryngeal operating have not been entirely fulfilled. This is true only so far as it relates to the hopes of those who did not fully understand the work, and who supposed that because the operative procedures were

direct, that it would be easy without special training for the operator already facile in ordinary faucial and pharyngeal work. Of course, it is true that until a man has worked a long time, he experiences the difficulty of which Bruenings speaks, and which I presume he has observed in pupils, namely, that the "delicacy and fineness of movement of the right hand is considerably interfered with by the left

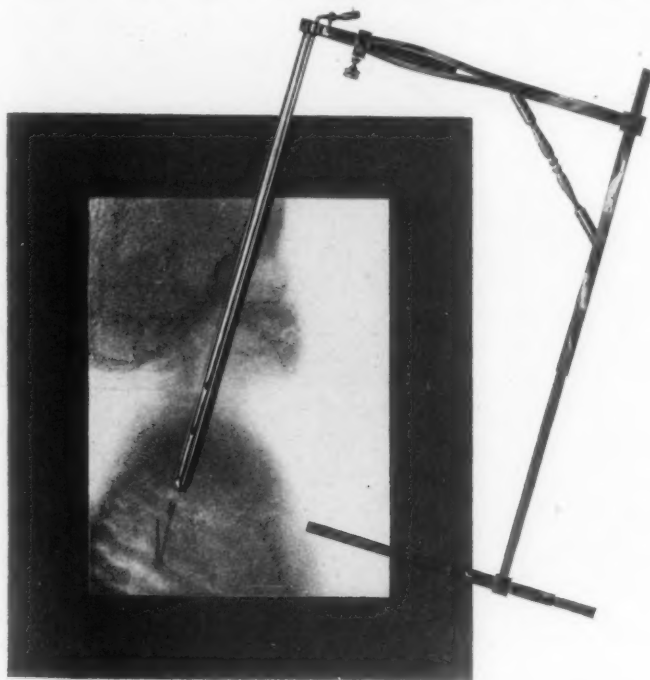


Figure 10. Illustrating the position of the caliper-guide in getting the adjustments by which the point of the bronchoscope can be brought, later at bronchoscopy, in close proximity to a foreign body. For use in case of small foreign bodies in minute bronchi. Suggested by Dr. John W. Boyce.

hand being exerted simultaneously." Yet on precisely the same basis it might be argued that the pianoforte is a failure, because the accuracy of execution in the treble is interfered with because "one hand only and that the left one" has to pound out those rich, full, deep, wide interval chords that are the great charm of the pianoforte. The difference is that the pianist expects to prac-

tice for years to acquire skill, whereas many laryngologists think that long years of laryngology should enable them to do skillful endoscopic work with little practice. If the pupil is taught to practice constantly the introduction of the laryngeal speculum with the left hand only, and using his right hand only to move the patient's upper lip out of the way of injury (with the index-finger), he will soon acquire perfect mastery of prolonged left-handed exposure and co-ordinate movement of the two hands in direct operating. I believe this has been too little insisted upon, though it is one of the most important conditions for the advancement of the usefulness of direct endoscopic operating. Greater skill can be acquired and all work expedited if all handling of tubes and specula be done with the left hand only, leaving the right hand free at all times for the manipulations of forceps and other instruments. Trained in this way, I believe the pupil will not be disappointed, especially if he has a trained assistant to place the patient's head and neck in the proper position, and to make counter-pressure with the index-finger upon the thyroid cartilage externally. This counter-pressure lessens, to a very great degree, the amount of pressure exerted with the left hand upon the tip of the speculum, with subsequent less exertion with the operator's left hand, and, of course, less discomfort to the patient. Papilloma in adults is always curable by repeated removals by direct laryngoscopy with interim applications of alcohol. Eventually there results a thickening and hardening of the laryngeal mucosa, which makes a bad soil for the growth of papillomata. The author has never yet failed to cure a case in adults in this manner; but the treatment has extended over a number of years in some instances. Papillomata in children in many instances will yield to the same treatment. In a few, however, it is necessary to do laryngostomy, with Roentgen-ray applications to the open larynx. The author is utterly at a loss to understand why writers on this subject persist in advising general anesthesia for the removal of papillomata in children. A general anesthetic is absolutely contra-indicated in every disease of the larynx in children. It is, moreover, absolutely unnecessary. Cocain is very toxic for children and should never be used, and it also is quite unnecessary. Skillful, direct removal is almost painless in children, and after a number of sittings children usually do not even cry, though infants usually do. The work of Harmon Smith on fulguration for the treatment of papillomata in children by endoscopic methods has yielded excellent results, and marks a distinct advance in the treatment of these stubborn cases. Abundance of

evidence has been forthcoming proving the great usefulness of the galvano-cautery in the treatment of tuberculous infiltrations in the larynx, and all of the laryngologists that have used the direct methods for these applications are enthusiastic as to the precision with which the caustic point can be applied. The direct method exposes to view the anterior surface of the posterior wall of the arytenoid masses, and thus the point can be applied practically perpendicularly

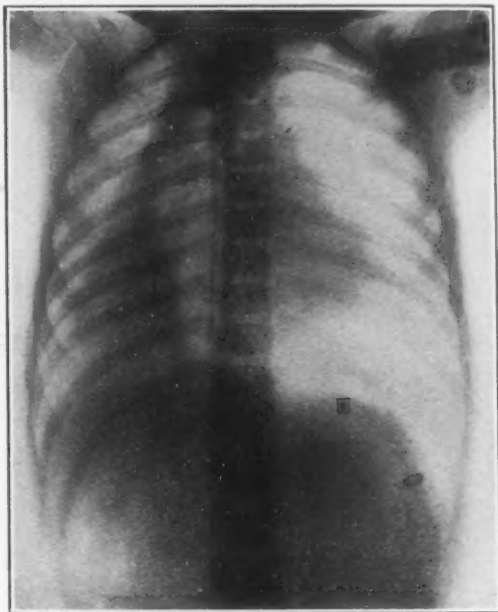


Figure 11. Radiograph by Dr. George C. Johnston, showing foreign body (primer) at the bottom of the pleural cavity of a child of 4 years. Foreign body removed by pleuroscopy.

to the surface, which is in great contrast to the indirect method by which a more or less lateral application of the point renders accurate puncture more difficult, and sometimes impossible. Furthermore, it matters little how intolerant the patient may be to the laryngoscopic mirror; he cannot in any case whatsoever prevent the skillful operator from making an accurate application. Direct laryngoscopy has opened up a new field in the local treatment of tuberculous lesions. The usefulness of endoscopy in malignant disease of the larynx ends with the inspection of both sides of the

party wall and the taking of a specimen. Following the initiative of Sir Felix Semon and Mr. Butlin, my series of cures of malignant diseases of the larynx from the operation of thyrotomy in intrinsic disease of small extent, has been such a gratification to me that I feel that it would be a step backward to attempt endo-laryngeal removal, and I have seen nothing in the recent progress of endoscopy to lead me to modify my views. The precision with which a specimen can be taken by the endoscopic method, so as to include a little of the bordering normal tissue, gives a character of certainty and reliability to the preliminary examination of the specimen that seldom pertains to the little fragments so often obtained by the indirect method. Plastic operations on the cicatricial adventitious vocal bands have yielded the author excellent results in cicatricial larynges following laryngostomy, the chondritis of typhoid fever, lues, tuberculosis, and also in one case of malignancy, which, after thyrotomy, had an anterior cicatricial web preventing approximation, as reported in a recent article by the author.

Bronchoscopy: The closure and removal of open safety pins in the esophagus has now become a relatively common procedure with the endoscopist, but the closure and removal of an open safety pin from the trachea by oral bronchoscopy has been recently very skillfully done by Hudson-Makuen. Space forbids mention of many mechanical problems of removal successfully coped with. A number of them go to prove that, however difficult the problem, the temptation to remove a foreign body by main strength must be resisted. Instead, careful thought will evolve a plan, by a new device or by a modification of the old, or by version of the foreign body—in short, some means by which the high percentage of mortality sure to attend forcible extraction may be obviated. Benign tumors within the lumen of the trachea, seem to be quite rare, though possibly when bronchoscopy for diagnosis comes to be more frequently resorted to, they will be more common. Emil Mayer reports the very interesting case of a child with a peculiar crowing respiration and physical signs of absolute obstruction of the lower portion of the right lung; ray-examination negative. At bronchoscopy, a papilloma was found filling the lower portion of a bronchial tube, and its endoscopic removal was followed by a cure. The endo-bronchial treatment for asthma and for other diseases, advocated by Ephraim and others, and used by Emil Mayer, Ingals, Yankauer, Horn, Freudenthal, and others in America, is becoming everywhere a recognized method of treatment in obstinate

cases. As Ingals has stated, it is not to be advocated for general use by everyone without previous endoscopic training. As Von Eicken has pointed out, it is unnecessary to introduce the bronchoscope in order to medicate the bronchi locally. Dr. Emma E. Musson introduces a soft tube through the glottis by means of the laryngeal speculum, and has demonstrated that after the examination of local

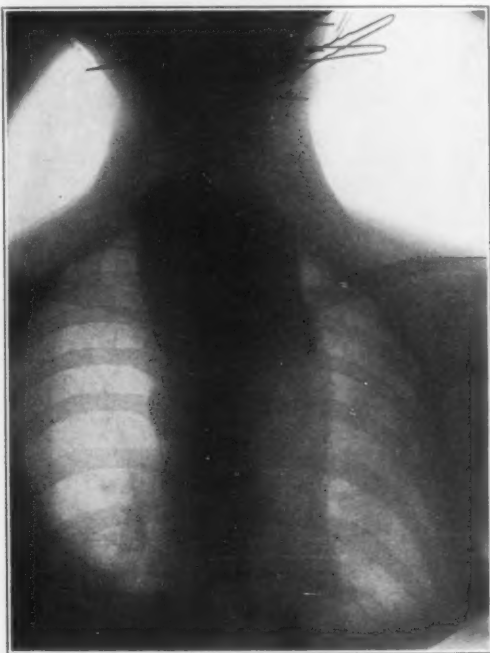


Figure 12. Radiograph of woman of 22 years simulating diverticulum. The bismuth porridge rests upon about 1½ liters of stale food in an enormous dilatation as demonstrated esophagoscopically after emptying. A case of abdominal esophagismus.

conditions is made bronchoscopically, an occasional bronchoscopy during the course of medication will suffice.

Indications for bronchoscopy: The following indications for bronchoscopy are offered for discussion that they may be added to, or subtracted from, as the consensus of opinion may indicate. In most instances an esophagoscopy is also indicated, especially in cases of suspected thoracic disease:

1. The appearance, in the radiograph, of a foreign body or of any suspicious shadow.
2. In any case in which there is a clear history of the patient having choked on a foreign body, and in which the foreign body was not afterward found. In this connection, it must be borne in mind that foreign bodies may be multiple, as in one case of my own in which a bronchoscopy was not done because after the accident a gourd seed was found in the stools. Three months later I removed a gourd seed from the bronchus. The child had been playing with a whole mouthful of gourd seeds.
3. In any case in which there are signs of stenosis of the trachea or of a bronchus.
4. In the absence of any foreign-body history, the patient giving symptoms of pulmonary tuberculosis, in which the bacilli cannot be found in the sputum and especially if the physical signs are at the base, particularly the right base, and above all, if there are physical signs of pleural effusion. A number of instances have been recorded (Ingals and others) in which prolonged sojourn of a foreign body in the lung had produced symptoms for which the patient was repeatedly tapped for a suspected pleural effusion without getting fluid. I have myself observed two such cases, one in which the foreign body was present seven years, and the other in which it was present ten years. Those patients had been treated for tuberculosis, and both had been tapped.
5. All cases of bronchiectasis should be bronchoscoped for foreign bodies, and also for local treatment. Emil Mayer found a foreign body in one case of bronchiectasis where its presence had never been suspected. I, myself, have found bronchiectasis present in two cases of prolonged sojourn of a foreign body in the right inferior lobe bronchus, though in both of my cases the foreign body had been discovered radiographically.
6. Every case of dyspnea, except, of course, pneumonia and similar well understood conditions, calls for bronchoscopy.
7. Every case in which tracheotomy does not relieve the dyspnea should be bronchoscoped to determine why the tracheal cannula does not give relief. All cases of hemoptysis which are not definitely proved to be tuberculous should be bronchoscoped for diagnosis, and any severe bleeding should be endoscopically packed as advised by Killian. I have examined a great many cases of hemoptysis to determine the cause of bleeding from the lungs. All of these cases had been, at some time or other, diagnosed as

tuberculosis, and many of them proved to be tuberculosis, but among the non-tubercular ones, there were three cases of aneurysm, two of cancer, three of lues. In quite a number of cases, it has been possible to make a diagnosis of tuberculosis from lesions found and specimens removed in cases where the physical signs had been negative, or at least negative opinions had been given by competent physical diagnosticians.

9. Every case of paralysis of the recurrent nerve the cause of which is not positively known.



Figure 13. Lateral radiograph (by Dr. Lange) of same patient as in Figure 9, the shadow of the bismuth mixture simulating diverticulum. This mass protruded in the neck and could be evacuated by external pressure with the patient's hand.

10. In any case of thoracic disease in which any element of doubt exists, valuable information may be gained by bronchoscopy.

11. In case of doubt as to whether bronchoscopy should be done or not, bronchoscopy should always be done.

Subglottic edema: The cause of subglottic edema is worthy of our most careful consideration. In the author's opinion, it makes a very great difference what instrument is used and how it is handled. We all know that the O'Dwyer intubation tube may stay in six or seven days without being followed by subglottic edema, except in rare instances. The O'Dwyer tube is short so that no leverage is exerted, and it is never larger than will comfortably fit

the lumen of the subglottic larynx. To my mind that is the keynote to the situation. Large-sized tubes roughly manipulated, and what is more important manipulated without a trained assistant whose business it is to keep the head in such a position that the trachea will at all times be in line with the axis of the tube so that the laryngeal tissues do not become the fulcrum upon which the bronchoscope may bear and press. Judging by the printed reports, it is customary with most operators to use a far larger diameter of tubes than is good for the infant larynx. Since 1911, by closely observing these points, not one case of subglottic edema has occurred in the practice of either Dr. Ellen J. Patterson or myself in thirty successful removals of foreign bodies in the trachea and bronchi of infants under one year, the youngest $2\frac{1}{2}$ months. Every case was done by oral bronchoscopy. In a number of instances, the child has become dyspneic within twenty-four or thirty-six hours after the bronchoscopy, but on passing the bronchoscope, a large quantity of secretion was removed with complete re-establishment of quiet respiration and the disappearance of the dyspnea. In other words, the child was drowning in its own secretions, because children expectorate with difficulty. This was especially noticeable in cases where the foreign body had been some time in the air passages, or where it was of an irritating nature like a peanut kernel. We have had altogether five cases of peanut kernels in the bronchi and in all there was present a severe bronchitis with abundant secretion. From these observations, and from the written report of cases where tracheotomy has been done for supposed post-bronchoscopic subglottic edema, the author feels sure that in a portion of these cases complete relief would have followed the peroral bronchoscopic removal of secretions, and he would especially urge that all cases of post-bronchoscopic dyspnea require not only a direct laryngoscopy for diagnosis, but a bronchoscopy for the removal of secretions which infants cannot expectorate. Tracheotomy, except in extreme cases, should not be done until after this, save when needed in following the cardinal rule of tracheo-laryngeal surgery that "in a dyspneic patient, tracheotomy should always be done early, never late." Unfortunately, the statement crept into the early literature that the child's larynx is more easily stretched than that of the adult, and this has led to the use of tubes entirely too large. In the author's clinic, both Dr. Patterson and myself use tubes of 4 mm. and 5 mm. internal diameter, for children under 6 years of age, the 4 mm. tube being for infants under one year. Our youngest patient from whom a foreign body was removed was an infant of $2\frac{1}{2}$ months.

This was a common pin removed from the right bronchus with a tube 4 mm. internal diameter. Faulty direction of the tube on introducing may easily cause trauma by gouging into the subglottic wall, if the axis of the bronchoscope and that of the trachea do not coincide at the moment the tube passes the glottis. In ten different publications within the last two years, the operators stated that they

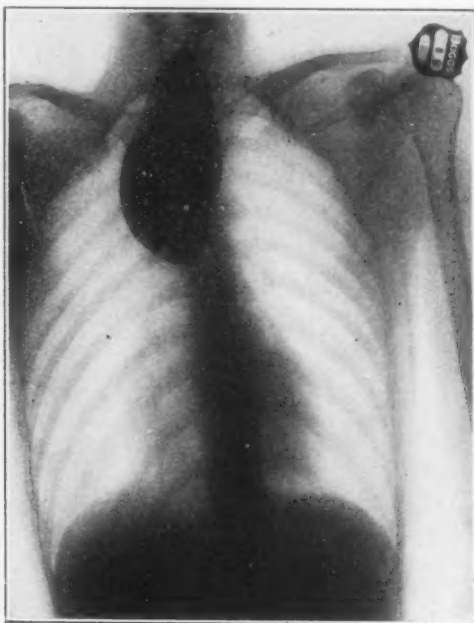


Figure 14. Radiograph (by Dr. Russell H. Boggs) of a woman of 38 years. The shadow, which so much resembles a diverticulum, was esophagoscopically proved to be a dilatation above a luetic stricture. The stricture is behind and above the bottom of the lower border of the shadow of the dilatation. Endoscopic dilatation resulted in a cure.

placed the patient in the Rose position. If the patient actually was in the Rose position, he was just exactly rightly placed for the bronchoscope to gouge into the subglottic wall and to risk a production of subglottic edema, especially if the head of the patient were a little more to one side than the other. Heavy hands and heavy handles, it must be conceded, are more likely to cause injury to the subglottic tissues than right tubes delicately manipulated. There-

fore, I think that heavy introducing instruments should be removed, leaving only the light delicate bronchoscopic tube for endo-bronchoscopic work.

Peroral or tracheotomic bronchoscopy. Which? Unfortunately, the statement has crept into the literature that in infants or small children it is preferable to do a tracheotomic bronchoscopy. In the opinion of the author this is due to two things: namely, the ignoring of the precautions mentioned under subglottic edema, and also the fact that when this statement was originally made, illumination was not in the relatively perfect condition that is seen on the instruments of to-day. In making this statement, the author hopes he will not be misunderstood as referring to any difference between distal and proximal illumination. He means simply that the light on all forms of instruments to-day is far superior to what it was in the early days. At that time it made a great difference whether the tube was a long one or a short one. To-day, I doubt very much whether any one can tell by looking through the lumen whether the tube is 30 cm. or 50 cm. The author has often tested this and found the observer unable to tell with a pair of concealed tubes which was the longer and which was the shorter, even though one was an 80 cm. gastroscope. Therefore, a short tube is no advantage so far as illumination is concerned. In regard to the manipulation of forceps, etc., an additional length of 10 or 14 cm. is of no advantage whatever. It is true that a somewhat larger tube can be used through a tracheotomic wound than through the glottis with safety to the subglottic structure, but Dr. Patterson and I have found that a tube of 4mm. internal diameter is amply large for delicate manipulations under the guidance of the eye such as the placing of a hook through the eye of a shoe button in the bronchus of a child 6 months of age. If one is not accustomed to work through small tubes, doubtless it is better to do a tracheotomic bronchoscopy than to force a large tube through the larynx. In upper lobe bronchoscopy, almost as favorable an angle can be obtained by shifting the tube to the opposite corner of the mouth, as could be obtained by a tracheotomic bronchoscopy, provided the assistant, holding the head, and the operator have worked years together so that they co-operate and the head of the patient is carried along with the tube to the extreme opposite position from the lobe to be explored. All of these things are readily demonstrated on the patient, but unfortunately the statements in the early literature have led men into hasty tracheotomy rather than to develop the necessary technic to work

with exceedingly small tubes and to avoid damage to the subglottic area. Out of 706 bronchoscopies for all purposes, no one in the author's clinic has ever done a tracheotomy for the purpose of

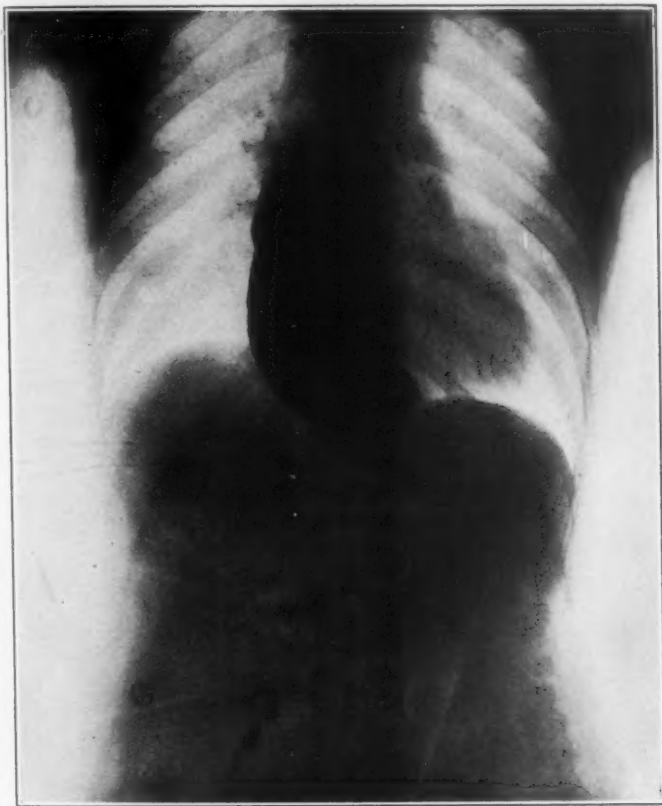


Figure 15. Radiograph (by Dr. George C. Johnston) of a woman of 45 years, showing an abdominal esophagismus which was afterward cured by endoscopic mechanical division. The "flat floor" of the dilatation shows why previously used blind methods had failed to introduce any instrument through the hiatus. The possibility of the radiograph being taken just before normal physiologic opening of the cardia in the deglutitory cycle was eliminated by the elapsed time.

bronchoscopy. The only lower bronchoscopy ever done by me for a foreign body was in a case where the general surgeon had already done a tracheotomy for the compressive stenosis due to a goiter. In

that case I failed to find the foreign body, a small pin. With that exception, it has always been our custom to insert the bronchoscope through the mouth, even in the cases already tracheotomized for dyspnea. Very often patients come in with such severe dyspnea that it is unwise to leave them over night without a tracheotomy. In such cases, the absolute rule in tracheal surgery to do a tracheotomy always early, never late, is followed; but in the first management of the case we have always found that a bronchoscope introduced through the mouth is much better for the temporary relief of dyspnea, insufflation of oxygen, etc.; and in foreign-body cases the bronchoscope introduced through the mouth is much more freely manipulated and much more satisfactory to work with because the patient's head is very much less in the way, and all of the movements and manipulations are the usual ones in peroral endoscopy.

Pleuroscopy: The author has, in one instance, removed a foreign body, a primer from a shotgun cartridge, from the pleural cavity through a small opening made in the chest by Dr. J. Hartley Anderson. This was done immediately after the accident and there was no odor or pus at any time. General anesthesia was given, and the child, after the chest opening was made, was placed in the sitting position in order that the foreign body would fall to the diaphragm. Healing was prompt and the air began to enter the lung on the fifth day. The child made a prompt recovery, and now, about a year after the operation, is in perfect health. In this class of cases, pleuroscopy promises excellent results if done immediately, before infection or inflammation has set in. Only a small opening is necessary, and this does not involve anything like the shock consequent upon the large osteoplastic flap. The only shock is the pleural shock, which is slight, and which in my case was present anyway because there was already a pneumothorax before the chest was opened. In a future case, I would aspirate the air after closure of the wound.

Mortality and results of bronchoscopy for foreign bodies: In considering the mortality of bronchoscopy, two facts stand out prominently. The first is that we should distinguish between the mortality of the method on the one hand, and the mortality from the lack of promptness and precision in performing it. For instance, the reports of four of the fatal cases show that the patients died upon the table of asphyxia for want of a prompt bronchoscopy. The reports received show very clearly that the mortality was in

the main in inverse ratio to the skill and especially to the experience of the operator. The best work with the lowest mortality has been done by those who have sufficient endoscopic work to keep not only

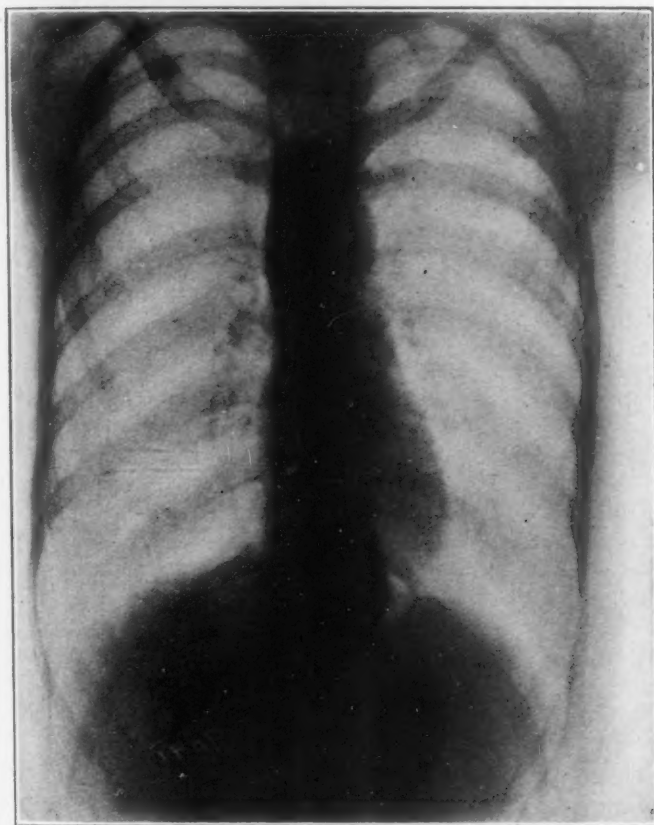


Figure 16. Radiograph (by Dr. J. C. Bowen) of a woman of 28 years showing an abdominal esophagismus with only very slight dilatation above it. The deviation of the esophagus by the aorta was verified esophagoscopically.

themselves but their assistants, nurses, in fact their entire organization in constant training. In 171 cases of foreign body in the trachea and bronchi, bronchoscoped during the last two years by various operators, there were nine deaths (5.3 per cent). This

does not include four deaths due to asphyxia for want of promptness in performing bronchoscopy. Of these 156 were removed, 140 by peroral bronchoscopy, twenty-two by tracheotomic bronchoscopy. Of the fifteen unsuccessful cases, twelve were failures to find the foreign body known to be present, and only three were failures to remove it when found. In the twelve cases mentioned as failures to find the foreign body are included four in which the foreign body had been seen when higher up, but after escaping into the deeper, minute bronchi it could not be relocated bronchoscopically, though still showing in the radiograph. The statistics of the author's own clinic and of his cases elsewhere, which are not included in the foregoing are as follows: Of the last 182 consecutive cases of bronchoscopy for foreign body there was a total of three deaths (1.7 per cent) from any cause whatever within one month, though not all of the cases could be followed this long. Of the 182 cases, all were peroral bronchoscopies. The only tracheotomic bronchoscopy for a foreign body ever done by the author was previously reported. It was unsuccessful as to removal. It failed to convince me of any advantage in the lower route, and the disadvantages are many. Of the 182 cases, the foreign body was removed in 177. Of the five failures to remove foreign bodies known to be present, all were failures to find a small foreign body that was in a small branch bronchus close to the periphery of the lung. Two of these cases were recent. The percentage of my failures will doubtless increase in the future, since I now get the cases upon which others have been unsuccessful and doubtless I shall be equally so; though I have hopes that the elsewhere mentioned recently perfected means of locating small bodies in small bronchi near the periphery will diminish for every one the number of cases in which the intruder cannot be found.

Mortality and results of esophagoscopy for foreign bodies: Of 193 cases of esophagoscopy for foreign body by various operators, the intruder was removed in 155. Of the thirty-eight not removed twenty-six went down. There were twelve deaths (7.8 per cent). It is interesting to note that of the twelve deaths from esophagoscopy for foreign bodies, eight were for bodies in the upper third, four of the patients dying during operation, and in all four the foreign body was not removed until after death. All had been given chloroform, though this was probably only indirectly the cause of death. In seven of the eight, the esophagoscopy was done by operators whose total number of cases was less than three. In the large

clinics (from previously published statistics) out of 210 cases of foreign bodies in this location, all were removed but twelve, and these went down. The mortality in the large clinics was 3 per cent. It is also interesting to note that in the present series of cases there were two deaths from laceration of the esophagus from violent removal of large foreign bodies, an artificial denture in one case, a

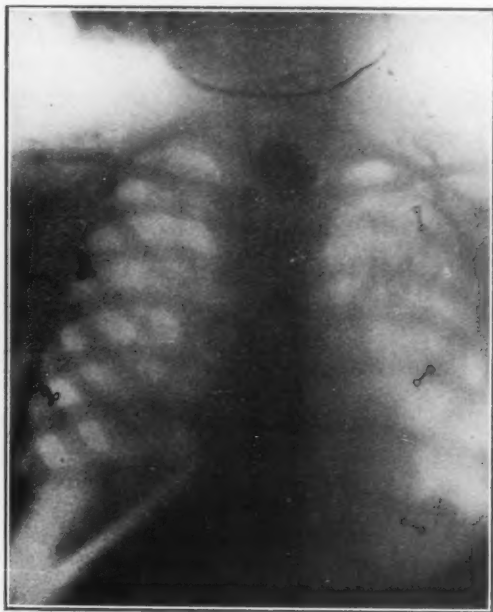


Figure 17. Radiograph (by Dr. George J. Boyd) of a coin in the esophagus, showing the diagonal respiratory esophageal movement, illustrating the necessity of the exact median position of the head if any diagnostic importance is to be attached to asymmetrical respiratory esophageal movement in esophagoscopy for suspected peri-esophageal lesions. This illustrates one of the disadvantages of the lateral position for esophagoscopy.

large and rough bone in the other. In both instances the operators stated, in effect, that they believed they could have succeeded in devising methods of safe removal, had they realized the danger of esophageal trauma. Of the 206 cases of esophagoscopy for foreign bodies in the hospitals of Pittsburg and in the author's work in other cities the foreign body was removed in 198, and escaped downward in eight. There were four deaths, one in a woman of

56 with advanced nephritis; the other three deaths were in patients admitted with severe lacerations of the esophagus, from previous attempts at esophagoscopy. Four other cases seen *in extremis* are not included because owing to profound shock no esophagoscopy was done. There is not, and there never will be, an absolutely safe esophagoscope that can be used otherwise than with care and caution, for even the soft stomach tube has caused perforation and death. But all endoscopists are now agreed that skillfully done under the guidance of the eye, esophagoscopy is practically without mortality, if considered apart from the trauma incident to foreign bodies and their extraction.

With the relatively high mortality from external esophagotomy, it certainly seems as though the operation is rarely if ever justifiable in foreign body cases. The author's personal experience is that with the full relaxation of general anesthesia with ether, (perhaps adding a little chloroform, if necessary, after the patient is under the stimulant effect of the ether) that any foreign body that has gone down the esophagus can be brought up the same way. The full relaxation prevents clamping of the foreign body by the esophageal musculature. But in many instances, in fact, perhaps in nearly all, mechanical ingenuity will devise a way to get the foreign body out, either by turning or morcellation, as in the historic case of Killian where a vulcanite tooth-plate was divided. Ingenuity will succeed where he who relies upon main strength and powerful forceps will meet disaster.

Contra-indications to esophagoscopy: Water hunger is the most serious of all contra-indications to esophagoscopy. Patients have frequently been sent into the author that have been able to get but little liquid down for a number of days, and it is the author's custom always to have a surgeon in readiness on arrival of the patient to have a gastrostomy done immediately, should the patient prove to be in a serious state of water hunger. In the absence of this precaution, it would be wise to have fluid introduced in the circulation by hypodermoclysis and enteroclysis simultaneously. In foreign-body cases there is no absolute contra-indication. If there is anything to be gained by it, a careful esophagoscopy may be undertaken by the trained hand and eye which will stop the procedure when an abnormal tissue which must not be passed or even touched is encountered.

"Cardio-spasm," phreno-spasm and abdominal esophagismus: Undoubtedly the old word "cardio-spasm," like many of the old words of medicine, covers a number of different conditions of inde-

pendent etiology and pathology, and it behooves us as endoscopists carefully to study the different endoscopic pictures throughout the entire esophagus, and as much of the stomach as possible, that we may bring order out of chaos. Much progress has recently been made. The diagnosis of esophagismus is easy in the typical case with an enormous dilatation, a white, pasty, macerated mucosa, and a contracted abdominal esophagus which, however, permits a large gastroscope to pass into the stomach after a delay; but in the early, or in the less typical cases, without dilatation it is often exceedingly

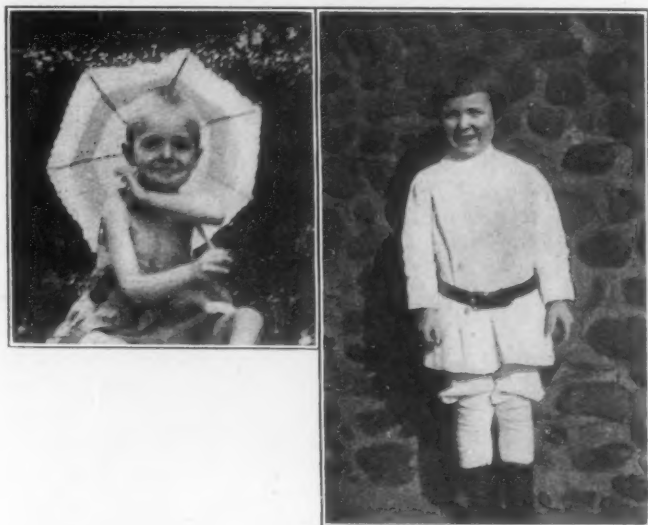


Figure 18. From photographs of a boy of 4 years. Weight when first seen, 26 pounds. After twenty-eighth endoscopic bouginage, 42 pounds. Patient referred by Dr. H. T. Price.

difficult to distinguish between purely spasmodic conditions and those of local lesions in the neighborhood of the esophagus but not themselves showing in compressions or very marked deviations of the abdominal esophagus. In such cases, while many esophagoscopists feel sure of their diagnosis, many do not agree as to what the endoscopic pictures are, and many endoscopists describe a picture which is seen by other endoscopists in the perfectly normal esophagus abdominalis. I believe it would be very profitable to all of us if every endoscopist present would describe the different endoscopic

pictures he sees in phreno-spasm or hiatal and abdominal esophagismus. No one to-day believes in a sphincter at the cardia, and the narrowing at this point that has been shown in so many text-books on anatomy is a misfortune. Hill quotes McAllister to the effect that there is no histologically demonstrable sphincter and he states that the circular musculature at this point is weak. Brown Kelley and Williamina Abel, by careful special dissections, have demonstrated that "it is quite apparent to the naked eye that both muscular coats are of uniform thickness, and that no special aggregation of fibers exist at or near the cardia," and that "nothing was found in any of the dissections or in the anatomical works consulted to justify Dr. Hill's statement that the circular fiber musculature was specially weak in this region." As endoscopists, however, I think that it would be better for us to abandon the word "cardio-spasm" and to substitute for it the three clinical types, which, according to my observation, can be made out as existing either separately or together. One of these is spasm at the hiatus esophagus, which, from its location, and from the fact that it is the diaphragmatic, not the esophageal musculature that is active, should be called phreno-spasm or hiatal esophagismus, while that occurring below should be called abdominal esophagismus, because it is very clearly proved by the endoscopic picture, and by the radiographs, two of which are here shown, that the entire abdominal esophagus is involved in the spasm, and it is not simply a spasm of the cardia. The word cardia is properly used as the name of the esophageal orifice of the stomach. Spasm limited solely to this orifice, is certainly exceedingly rare, while spasm of the abdominal esophagus and of the esophagus at the hiatus, either separately or together, are relatively common, and should be called by their proper names, and the word "cardio-spasm" should either be dropped as a misnomer or limited to those rare cases of true cardiac esophagismus. Brown Kelley has demonstrated the experimental fact that section of the vagi without stimulation, is followed by dilatation of the lower part of the esophagus and contraction of the cardia, which he rightly says corresponds to the supposed condition in cardio-spasm. But as a clinical fact, I have rarely found such a condition in the disease commonly known as cardio-spasm. It is quite certain that in a large majority of the cases there is a certain basic general nerve disorder. In one instance, a patient who was quite hysterical would get an attack of abdominal esophagismus whenever everything did not please her. For instance, she took the notion that the endoscopic divulsions that I was applying to the abdominal

esophagus were doing her so much good that they ought to be done every week instead of every two weeks. Regularly the day before the one week was up, her abdominal esophagus would shut up and the dilatation above it would fill. By this I do not mean that she had voluntary control of it, but that the emotions sought their outlet through habitual nerve channels producing a recurrence of the abdominal esophagismus, which she had had since childhood. This "nerve cell habit" is one of the most frequent causes of recur-

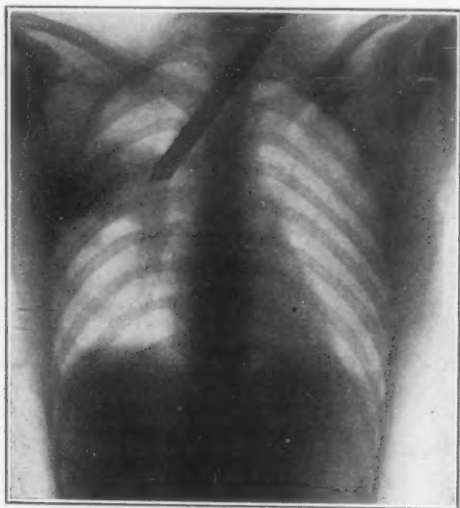


Figure 19. Radiograph (by Dr. George C. Johnston) of bronchoscope in the right upper lobe bronchus of a woman of 25 years (patient of Dr. Otto C. Gaub). The bronchoscope was inserted through the mouth and the angle is shown to be as advantageous as would be possible through a tracheotomic wound. The position of the patient is easy and natural in this instance, the radiograph being made for verification of the overlay localization in a suspected case of interlobar abscess. Had demonstration been the object, the upper part of the tube could easily have been brought to the clavicle.

rences. In certain cases, there are undoubtedly lesions of the mucosa in the esophagus and also in the stomach, which could easily excite spasms, and it is equally certain that stagnation due to the spasm, and consequent fermentation of food, detention of secretions and maceration could very easily excite or perpetuate the lesions. Thus we have a "vicious circle" in hiatal and abdominal esophagismus. Observations by Guisez, MacKinnie and also some

observations of my own, point clearly to the fact that these lesions can produce organic stricture. The frequency with which spasm of the abdominal esophagus occurs in connection with gastric carcinoma indicates very plainly that the reflex can have its source in the stomach which seems to confirm the theory that hyperacidity may be a cause in some instances. The theory that diffuse dilatation is the cause rather than the effect of spasmodic closure of the abdominal esophagus has been negatived by Jesse Meyer, who has proved that after the cure of a "cardio-spasm" and the complete relief of all the symptoms, the dilatation of the esophagus remains. A number of observers have confirmed observations of Kovacs and Stoerk in regard to the kinking of the esophagus by enlargement of the left auricle. I myself have since observed in two cases very marked deviations from this cause. In both cases there had been no symptoms referable to the esophagus but a large mass of meat had lodged and was removed esophagoscopically. In a number of other cases an enlarged aorta has deviated the esophagus as in the radiograph shown, and Boyce has demonstrated that there is a type of "neurasthenic" patient with an enlarged but not definitely pathologic aorta, that is particularly prone to phreno-spasm and abdominal esophagismus. In these cases, Boyce has demonstrated an unusually palpable and enlarged abdominal aorta. Cases of phreno-spasm and abdominal esophagismus, even more than diverticulum, remind one of the ingluvies of birds, inasmuch as the dilated esophagus fills quickly, and yet there is a constant leakage, which allows a certain proportion of the food to pass on through at a relatively slow rate. In one of my patients, the cure of the abdominal esophagismus resulted in food going through so promptly into the stomach, that taking food excited nausea for quite a long time until the stomach became accustomed to the unusual sensation of having food go through directly when swallowed. Treatment of abdominal esophagismus and hiatal esophagismus, has led to the devising of a number of different water-bags and air-bags, which have yielded good results. In some cases, however, it is impossible to introduce them. The author's personal preference, like that of Bruenings, is for a mechanical divulser inserted through the esophagoscope where the sense of touch and the precision of a steel instrument gives one an accurate control. I use the divulser of Mosher. Undoubtedly there are a few cases that are prone to recur, and the most stubborn are those existing since childhood, with consequent infantile stomach and long-established "nerve cell habit." The neurologist has cured some cases after both the endoscopist and the internist

had failed. In addition to the three forms that I have mentioned, cardial esophagismus, preno-spasm and abdominal esophagismus, there are, of course, the neuroses of the esophagus higher up, but it is still, I believe, an unsettled question as to what extent these so-called neuroses have an anatomic etiologic basis. Progress has been made, but to analyze it would unduly prolong this paper.

Cancer of the esophagus: The diagnosis of malignancy here as elsewhere in the body is usually readily made by gross appearances in advanced cases, but as elsewhere, the very much to be desired early diagnosis depends upon the histologic examination of a specimen. The specimen should be ample, and should, if possible, include a little of the adjacent normal, though greater care is needed here than elsewhere as to the amount of normal that may be taken. A little of the mucosa is sufficient. The only contra-indication to the taking of a specimen is such a profoundly anemic condition that oozing which may follow may turn the balance against the patient. This anemic condition is usually only found in those cases that have been permitted to become moribund from hunger and thirst from too-long-delayed gastrostomy. In such cases the gastrostomy should be done at once and the patient fed until the specimen may be taken with safety. Unfortunately, such patients, especially if there has been a few days of water hunger, make exceedingly bad surgical subjects, so that the minor operation of gastrostomy assumes a high mortality. It is usual among endoscopists in the diagnosis of cancer to attach a great deal of weight to asymmetrical aspiratory movement of the walls of the esophagus. In doing this, it is very necessary that the patient's head be exactly in the median line and the body straight. The twisting of the head to one side is very apt to alter the symmetry of the visible normal esophageal lumen. This is demonstrated graphically in the radiograph here shown. The twisting of the child's head side-wise causes the image of the coin to be elongated owing to the fact that the coin is moved diagonally instead of antero-posteriorly by the normal respiratory movements, owing to the child's head being strongly rotated to one side. Cancer of the esophagus has at the present day 100 per cent mortality, but there is good reason to believe that the surgeon will show a certain percentage of cures as soon as physicians will promptly refer to the esophagoscopist all patients showing the slightest abnormality referable to the esophagus. Thus only can we hope to discover and treat the pre-cancerous conditions of leucoplakia, erosion, maceration, chronic esophagitis, etc. That the physician may do this without hesitation, it

behooves the esophagoscopist to so perfect his technic and develop his skill that a patient may be esophagoscoped without distress and without anesthesia, or at most with local anesthesia limited to the pharynx. The work of Henry Janeway has convinced me that resection of the thoracic esophagus is a practicable procedure and will be frequently resorted to as soon as early esophagoscopies shall make the necessary early diagnosis. In the palliative treatment of inoperable esophageal cancerous stenosis, gastrostomy may be postponed by esophageal intubation in many instances until very nearly the termination of the case, though by this I do not mean that gastrostomy should be postponed one day after it is clear that nutrition is going to suffer. It is, of course, much more satisfactory to the patient to swallow his food even though it be liquid, than to have it poured in through the abdominal wall. Esophageal intubation has been very satisfactory in the author's hands. He is not prepared to say that endoscopic methods are in any way preferable to those of Charters Symonds, for the introduction of a tube. All forms of clear liquids will go through esophageal intubation tubes of 4 mm. internal diameter, and raw or very slightly cooked eggs can, with care, be swallowed with much satisfaction by the patient whose esophagus is thus intubated. In fact, any finely masticated food will go through, though occasionally imperfectly masticated particles may lodge in the smallest tubes. The author has had these tubes worn for quite a number of months without exciting ulceration, though, of course, cancerous ulceration was been better spent in perfecting the operator's personal skill in already present in some instances. Of course, the tubes were removed at frequent intervals for cleaning and were replaced. It is essential to have a duplicate tube for immediate replacement, else the esophageal channel will quickly close so that a smaller tube will be needed. Eventually a smaller and a smaller tube is needed anyway, until none can be introduced.

Angioneurotic edema has been added by H. Arrowsmith to the list of diseases observed in the esophagus.

Gastroscopy: Recent developments have been noteworthy. In different parts of the world, earnest workers have been perfecting technic and instruments. It has been said that the time wasted in an effort to develop a substitute for the straight tube would have ducing the straight tube. While this may be true, it is unwise to discourage effort. It is now universally accepted that safety demands that introducing shall be with a tube devoid of a lens system, in order that lesions may be detected and avoided, and that the

axis of the instrument may be readily kept in line with the esophageal axis. After the distal end of the tube has reached the stomach, a plug with a window has been used in the proximal end of the tube so that positive pressure from an oxygen tank (Janeway) or a hand bulb may be used to push away mucosal folds, and when a lens system is inserted in the tube in the form of a long tube with a window in the side of the distal end, an excellent view of the distended stomach is obtained. The author personally can testify to the beautiful view of the pylorus obtained in the Janeway gastroscope, and while the use of inflation and of a lens system for gastroscopy is at least thirty years old, yet the optical formula and the particular combination of illumination, lenses, inflation apparatus and tubes in the Janeway gastroscope make it one of the greatest of all recent advances in gastroscopy of which the author has personal knowledge. Excellent results have also been obtained by Hill, Elsner and others, and all of these instruments are now doubtless developed to a point where the personal skill of the operator counts for more than the particular instrument. The usefulness, safety and practicability of the gastroscope is an accomplished fact. The need now is for careful, skillful men who will use it. The value of gastroscopy in establishing a diagnosis in severe and obscure stomach disease has been abundantly proved. The tendency, however, to resort to it only in very serious conditions prevents its greatest usefulness, which would be in the early diagnosis of cancer and of pre-cancerous conditions. When endoscopists, who have developed the gastroscopic technic, are sufficiently numerous and sufficiently skillful so that the physician or the surgeon may feel justified in sending them cases before the patient's condition becomes desperate, gastroscopy will be of great use to the physician and surgeon, but gastroscopy probably will never be done by the physician or the surgeon himself. He will take the endoscopist's report along with that of the radiographer and analyst and decide as to the best handling of the case, just as the otologist in a brain case takes the report from the internist, the laboratory, and the ophthalmologist. Unlike tracheobronchoscopy and esophagoscopy, it may be said of gastroscopy that while its positive reports are extremely valuable, its negative reports are less so, just as with ophthalmoscopy in brain disease, the Wassermann reaction, and many other of our most valuable aids in medicine and surgery. A very important point in increasing the range of mobility of the distal end of the gastroscope in the stomach has been demonstrated by Henry Janeway. It consists in

an elevation of the knees of the recumbent patient to the vertical or flexed position, as this relaxes the abdominal wall.

Mortality gastroscopy: That there is practically no mortality from gastroscopy in very careful hands has been shown by the replies to the author's circular letter of inquiry. Out of 110 cases done by eight different endoscopists there was no mortality within two weeks after operation from any cause. The author has now examined the interior of 238 living stomachs with the peroral gastroscope, and so far only one patient has died from any cause whatever within one month after the gastroscopy. As previously reported, this patient was moribund from a bleeding ulcer of the stomach when admitted to the hospital. But, taking the figures just as they stand, the mortality is only a fraction of one per cent.

Conclusion: In conclusion I wish to say that recent progress in endoscopy of the larynx, trachea, bronchi, esophagus and stomach has shown very clearly that all future progress will depend on those who have the time and opportunity to develop an organization with assistants and nurses well trained, and to develop by continual practice the skill which the musician must have with his instrument; and while it is given to but a few like Killian, Von Eicken and Bruenings to be the Paderewskis of endoscopy, yet anyone who will practice continually and keep himself in continual training, may do good work and contribute to the future progress of endoscopy.

Westinghouse Building.

Direct Laryngoscopy, Tracheo-Bronchoscopy and Esophagoscopy.

LOGAN TURNER and J. S. FRASER, *Edin. Med. Jour.*, Jan. and Feb., 1913.

This paper contains a general description of the instruments and technic, and is intended for those not familiar with modern endoscopic methods. In reference to the examination of the esophagus it is laid down that the bougie should not be used in suspected cases of carcinoma and foreign body, also that no case of difficulty of swallowing should be regarded as hysterical without direct examination of the gullet. Several cases are described, two of them examples of malignant disease of the hypo-pharynx and upper end of the esophagus, in which a circular portion of pharynx and esophagus were successfully removed, one of the patients being in good health two years later.

GUTHRIE.

THE REMOVAL OF FOREIGN BODIES FROM THE UPPER END OF THE ESOPHAGUS.*

DR. RICHARD H. JOHNSTON, BALTIMORE.

The upper end of the esophagus is that portion included between the clavicle below and the cricoid cartilage above. In this area foreign bodies usually lodge because these two points are the narrowest in the esophagus. We may say that the removal of foreign bodies is limited to this area meaning about an inch and a half or two inches in length. Success in this work depends upon two factors. A proper position of the patient's head and the manipulation of a short instrument of sufficient diameter to see and to work through. Foreign bodies, especially if flat, lodge in the esophagus with the edges lateral. As a rule they are located back of the middle line which accounts for the fact that the ordinary esophagoscope slips over the anterior plane and the entire esophagus is examined without finding the object. Such cases have been reported by skilled operators. The method of throwing the patient's head over the end of the table probably has something to do with failure to locate the foreign body at once, since the tense muscles tend to force the object back. In my own work I long ago discarded extension of the head in examining the upper end of the esophagus. I am convinced that relaxation of the muscles is the most important point in the examination and this can be obtained only with the patient's head straight on the table. The elasticity of the tissues allows great freedom of movement and by manipulation with the instrument the right angle of the throat becomes straight. The foreign body immediately comes into view and is seized with forceps and removed.

One who has tried extension of the head with its difficulties and then turns to the straight method will at once perceive the advantages of the latter. There are operators who are skillful in extension but they have become so, by long experience. When the novice attempts it, it is so difficult that he is tempted to give up in despair.

METHODS OF EXAMINING THE UPPER END OF THE ESOPHAGUS.

Extension: This method has reached a high state of perfection through the work of Dr. Chevalier Jackson, and Dr. J. W. Boyce who has developed a position of the head known as the "Boyce posi-

*Read at the annual meeting of the American Academy of Ophthalmology and Oto-Laryngology, Niagara Falls, August 22, 1912.

tion." Dr. Jackson emphasizes the fact that the head must be held just right which necessitates a trained assistant. In this method the head and shoulders are pulled over the end of the table and held by an assistant. The objections to extension are the tenseness of the neck-muscles, which must be overcome by pulling and the position of the instrument which is suspended in the air with the left hand and which cannot be long held on account of the strain on the forearm. For these reasons I think a simpler method is to be preferred.

2. *Flexion*: This method was worked out by Dr. H. P. Mosher in 1908. Under general anesthesia the patient's head is turned to the left until the cheek almost touches the plane of the table. The head is then flexed on the chest. The operator sits at the left, facing the head and introduces the special spatula between the left bicuspid teeth. The tongue is pushed to the opposite side and the cricoid cartilage lifted which exposes the esophagus to the clavicle. So far as I know this method cannot be used without general anesthesia which exposes the patient to unnecessary risk. This objection does not apply to extension in which the patient's head can be forcibly held over the end of the table. It is, however, more difficult to hold the head than in the position which I will now describe. All I have said above applies to children, since a satisfactory examination can nearly always be made in adults under local anesthesia with the patient sitting.

3. *Straight position*: The position of the head is the same as in the straight method of direct laryngoscopy which I worked out in 1908. In this method the head lies straight on the table. In children up to 8 years of age no anesthetic is needed. Cocain is dangerous and since the method is designed to make esophagoscopy simple and practically free from danger, general anesthesia is not used. The little patient, securely pinned in a sheet, is placed on the table. The head is held by an assistant while the arms and legs are attended to by nurses. Jackson's old child's speculum is introduced between the incisor teeth and pushed rapidly down behind the larynx, which is gently lifted, exposing the upper end of the esophagus for about two inches or to the clavicle. The instrument may be pushed below the cricoid cartilage if desired. Since the speculum has a diameter greater than the average esophagoscope, one sees much better through it. Because of the relaxation of the muscles and the position of the instrument from above downwards and backwards, it is practically impossible to miss a foreign body which, once seen, is easily removed. With this method esophagoscopy can be done anywhere since no special assistants are needed. Since

developing the method I have used no other in the examination and treatment of the upper end of the esophagus. In adults the examination can nearly always be made with the patient in the sitting position under local anesthesia. The head is only slightly extended and the same instrument with a modified handle is used.

The speculum is introduced and the larynx pulled forward. In most cases a good view of the upper end of the esophagus is obtained. If necessary the tube may be passed down below the cricoid cartilage for half an inch or more. In this way I have succeeded in diagnosing tumors and foreign bodies. In three patients foreign bodies have been removed. From my experience I believe all foreign bodies can be removed through the esophagoscope. The most dangerous part of the work is the general anesthetic and with the further development of esophagoscopy practically all patients will be examined without it. Skillful operators use no anesthetic in children but claim that in adults ether is necessary to secure proper relaxation. This is not in accord with my experience. For many months I have succeeded in passing the esophagoscope with the patient sitting and prefer it to the prone position.

A contemporary in an article published recently makes the following statements: "Although the esophagoscope has greatly aided in the management of impacted foreign bodies in the esophagus, it has not and cannot entirely supplant the older methods. There are not a few cases in which the time-honored methods of operating are simpler, easier and quite as effective as esophagoscopy." He then describes the removal of common pins and fish bones with the old bristle bougie which he describes as an instrument than which none is more generally useful and effective and which can be employed with almost perfect safety. For the removal of coins and buttons often nothing is better than the old, bent esophageal forceps or a straight, smooth, blunt-pointed, toothless, eight-inch hemostat. He then cites several cases of foreign bodies in the upper end of the esophagus which he failed to locate for a long time with an ordinary esophagoscope because the instrument repeatedly slipped over the object.

I cannot agree with the conclusions of the author. To me it is clearly obvious that a short, wide esophagoscope in the hands of a careful, skillful operator, is far safer than blind groping with any forceps. The majority of fatalities in foreign bodies have been due to the blind use of forceps and bougies. I have never failed to locate and remove a foreign body within a few minutes with the instrument described above, and I attribute my success to the fact that

it is practically impossible to miss seeing the object in the esophagus. Since adopting the straight position of the head, I have found the work much easier. The operator stands to the left of the patient facing the head and passes the instrument with the left hand leaving the right hand free for operative work. In a recent article by a contemporary, attention is called to the advantages of the short, wide speculum in the location and removal of foreign bodies from the upper end of the esophagus in children.

In the *New York Medical Journal*, September 4, 1909, I reported the following case: A child 2 years old, while playing in the street, picked up a lead disc the size of a five-cent piece and attempted to swallow it. That night she vomited several times and was unable to swallow solid food. Two days later she was taken to St. Joseph's Hospital, where it was found she was only able to swallow a little liquid. A radiograph, taken that day, showed a shadow at the seventh cervical vertebra. The next day the patient was etherized and the upper end of the esophagus examined with Jackson's child-speculum in the extended position. On pulling the larynx upward the disc was seen tightly wedged in the esophagus in a lateral position. Jackson's short forceps was passed through the tube and the disc removed.

It will be seen that the use of the short, wide instrument is by no means new.

To illustrate the improved technic in the management of foreign bodies at the upper end of the esophagus in children, I wish to cite the following case: A little girl, 2 years old, was brought to St. Joseph's Hospital with a five-cent piece in the esophagus. The radiograph showed the nickel just below the cricoid cartilage. For a week the child had swallowed liquid food only. The little patient and held by an assistant. No anesthetic was used. Jackson's old speculum was passed back of the larynx which was easily lifted. The foreign body immediately came into view located in the back was pinned in a sheet and placed on the table with the head straight part of the esophagus with edges lateral. Pfau's extension forceps was passed, the coin seized and promptly removed. The whole procedure did not take two minutes. The child scarcely had time to cry and was taken from the table unhurt. In less time than it would have taken to get ready for the extended position the foreign body was removed.

The straight method with the short instrument makes esophagoscopy one of the simplest procedures in surgery.

807 North Charles Street.

A BRIEF PATHOLOGICAL STUDY OF PAPILLOMATA WITH REFERENCE TO THEIR EXISTENCE WITHIN THE NOSE.*

DR. RUFUS B. SCARLETT, TRENTON, N. J.

Epithelial tumors are characterized by the development of tissues which are derived from two of the blastodermic layers; the cells covering the papillae having their origin either from the ectoderm or the entoderm, although the epithelium of a papilloma as found within the nose is usually a product of the outer layer, or the ectoderm. The connective tissue, or the supporting framework of the growth over which the epithelial cells proliferate and develop, has its origin from the middle layer, or the mesoderm.

A papilloma within the nasal chambers is a comparatively rare tumor of a non-malignant character, arising from the mucous membrane, and showing a predominance of epithelium over the connective tissue elements; the relationship between the two layers, however, is dependent upon the amount of proliferative changes that have taken place within the respective tissues.

The essential and conspicuous elements of this variety of tumor are the epithelial cells; the supporting structure, as a rule, being no more than slender stalks of connective tissue carrying within their meshes ill-developed vessels, with a scattering here and there of small, round cells. The two layers are separated by a delicate basement membrane, which is regarded as a derivative or a modification of the subjacent connective tissue. As the result of this dividing membrane, therefore, it will be seen that the proliferating epithelium forming the tumor proper is outside of the vascular area, and while these cells contain no blood-vessels of their own, the necessary nutrition is maintained by the absorption of juices of a nutritive nature which pass to the cells by way of the minute clefts within the intercellular substance.

In the development of papillomata, the new cells have their origin in close proximity to the vascular area, but as previously mentioned, separated from it by the membrana propria. They are usually arranged in an orderly manner and appear with marked persistence in normal relation to the basement membrane. As the

*Presented as a candidate's thesis to the American Laryngological, Rhinological and Otological Society, May, 1912.

cells develop and become older, they show a tendency to lose the liquid part of their contents. This is the result of the pressure to which they are subjected through their more distant removal from their origin by the development of newer cells, and also in consequence of their exposure to external influences on the surface. The naked-eye appearance usually shows the papilloma of the nose to be composed of branched processes, and the whole mass to resemble an immature cauliflower.

Of the two varieties of papillomata, the squamous-celled is the more frequently found within the nose, in spite of the fact that the greater part of the nasal cavities is lined with columnar cells, the remaining portion having a specialized epithelium. According to the older writers, the chief histological difference which distinguishes the two varieties lies in the character of the epithelium. A papillary tumor covered with proliferating squamous epithelium was considered by these investigators as hard, even though the palpable sensation imparted may not have been as firm as in a growth with a greater amount of stroma, but supporting columnar epithelium. This latter condition they designated as soft.

It will be seen, therefore, that in spite of the fact that a liberal proliferation of the connective tissue cells may have taken place in a papilloma covered with columnar epithelium, and the growth may in reality be firmer than the squamous-celled variety, according to the foregoing classification, it would be considered soft. It may be true that under the microscope, the arrangement of stratified squamous cells may be such that the impression of a certain degree of firmness is given; while columnar epithelium, with frequent modifications, often assuming the shape of goblet cells, may give the idea of a less degree of density, and therefore be considered the characteristic cells of the soft variety.

Thus, as the nomenclature of the past appears to permit an incorrect and unsatisfactory classification of epithelial tumors, I make bold to declare against the further use of the terms hard and soft, and advise that a more definite classification be made which will harmonize with the recent views on the subject, suggesting the arrangement of papillomata according to the character of the epithelium into squamous-celled or columnar-celled. With this distinction in mind, the embryological difference may also be significant, for we find the former are developed from the ectoderm, while the latter, as a rule, are not found within the nose, but have their origin from the mucous membrane lining the hollow viscera, and are paved with epithelium which is derived from the entoderm.

The degeneration of a papilloma into a malignant tumor is most likely to take place in those growths whose situation frequently exposed them to irritation. The development of such a change indicates a disturbance or loss of the normal relationship between the epithelial cells and the underlying connective tissue. A modification is also evident at the same time in the histological structure of the cells of the benign tumor and in its environments. As long as the basement membrane, which limits the downward growth of the epithelium is intact, the tumor retains its benignancy, but the moment this normal barrier is destroyed as the result of prolonged and repeated irritation, or it may be in consequence of a marked predisposition, embryonic cells are permitted entrance into the vascular area, and the transformation from a benign tumor to one of malignancy is thereby encouraged, with manifestations in time of symptoms of carcinoma.

The development of the epithelium in papillomatous growths is significant. In the benign tumor the cells proliferate toward the surface, the mucous membrane retains a healthy appearance and does not become infiltrated; but when malignancy takes place, the epithelium shows a tendency to penetrate into, and to proliferate within the subjacent areas, and to implicate the surrounding tissue, producing a stiffness of the part.

To what extent this transition takes place in papillomata appears to be a point more or less disputed. That such a change does take place in other parts of the body is an accepted fact, but owing to the infrequency of papillomata within the nasal chambers, little opportunity has been afforded for extensive study; nevertheless the literature records one or two instances in which the actual transformation was followed practically throughout its entire development.

While it is doubtful if degeneration of a papilloma of the nose into a sarcoma has ever been detected, such a change has been recorded as having taken place in a papillary growth of a joint. Post-natal embryonic cells within the connective tissue-part of the tumor are held as being responsible for this degenerative change. May not some of the sarcomata within the nose owe their origin to a papillary growth, the benign tumor not being detected until malignant changes have taken place and developed to such an extent as to destroy all trace of the primary tumor, and even before the evidence of a new growth has manifested itself? To some, this may seem impossible, but with the study of the formation of tissues, we find that the structure and the character of a new growth is in-

fluenced almost entirely, or is dependent upon, the stage of arrested cell development, and the embryonic layer from which the matrix has its origin. The connective-tissue portion may readily be the part affected and responsible for the production of the new growth.

With the occurrence of a papillary tumor within the nose, the difficulty of determining its true nature is evident by the similarity in its gross appearance to other growths found in the same locality. In the majority of cases the microscope is the only deciding means.

From the diagnostic standpoint, carcinoma presents a distinguishing feature, in that almost without exception there exists a certain degree of induration at its base, which condition is never found in the benign papilloma. The microscopical appearance shows the presence of epithelial cells beyond their normal zone, and when these elements exist, even in a limited number, within the sub-epithelial tissue, it is distinct and positive evidence of malignancy. In time, disorganization of the part affected will take place, and a tendency to metastatic distribution will be manifested. The dissemination of carcinoma cells, the tendency to involvement of adjacent tissues, and a more or less rapid development is in distinct contrast to a papilloma, which is non-irritating, remains local, and is of slow growth.

An inflammatory swelling of a papillary nature may be the source of confusion; however, its sudden appearance, the tendency to multiplicity, and definite signs of inflammation are characteristic; and further, the microbic cause of the lesion can usually be ascertained. A minute examination of the tissue will show distinct evidence of inflammation as the result of the organismal infection. The existing proliferation can be traced to the action of the offending organisms or their toxins, upon pre-existing, mature tissue-cells, whereas in papilloma, the increase of tissue is the result of proliferation and development of embryonic or pre-existing immature cells, which are not utilized in the growth and development of the part.

For many years Hopmann and his followers were led astray by the existence within the nasal chambers of polypi, which had assumed a folded, convoluted or furrowed appearance, undoubtedly as the result of the pressure to which they had been subjected in the limited space in which they were found, and which were classed by these investigators as papillomata. It remained for Wright, however, in 1891, to point out with unusual clearness the existing error, and to show wherein the two conditions are readily differentiated. He was able to demonstrate beyond doubt that the former results from changes within the connective tissue, with no break in

the regularity of the surface epithelium; while proliferating epithelial cells, within restraint by the basement membrane, are responsible for the benign papillomatous growth. Later contributions of note by Douglass, McKinney, Arrowsmith and others corroborated the above views, and further established the differentiation between the two conditions.

Papillary hypertrophy of any one of the turbinal bodies may exist, and will often necessitate the most careful scrutiny to differentiate it from papilloma. Here, also, the change causing the enlargement takes place within the connective tissue underlying the epithelium and forming its support. The line of the surface epithelium, as a rule, is not disturbed, while in papillomata the microscope shows that the thickening and irregularity of the epithelial elements are marked, and a decided budding appearance of the surface is presented.

The study of papillomata of the nose, or any tumor for that matter, soon makes one cognizant of the difficulty often encountered in attempting to make a positive diagnosis of the existing lesion without the aid of the microscope. It is certain that even if the macroscopical appearance does indicate to a satisfactory extent the nature of the growth, it is impossible without the examination of sections to detect the earliest penetration of the basement membrane by epithelial cells, which might mean the saving of much discomfort, and maybe the patient's life. The differential diagnosis is usually not difficult if one bears in mind the normal relationship between the tissues involved.

78 North Clinton Avenue.

Diphtheria Bacilli in Secretions of Nose and Throat in Infants With Nutritional Disturbances. E. CONRADI, *Muench. med. Wchnschr.*, March 11, 1913.

In the course of one year Conradi found diphtheria bacilli twice in the throats and eight times in the noses of infants suffering from digestive disturbances, but with no manifestations of diphtheria. Though these bacilli appeared in the secretions for from two to four months, they displayed no specific pathogenic properties.

ED.

SUGGESTIONS IN ACOUMETRY.

PROF. G. GRADENICO, TURIN, ITALY.

The suggestions refer to the "vocal" hearing tests as well as to tests by means of simple musical tones.

A. Vocal tests: Owing to the limited dimensions of available rooms in common practice, and also with a view to excluding the ear not involved, the hearing is usually tested by means of the so-called "vox aphona" or whispered speech. Still there is no doubt as to the convenience of testing the hearing with conversational speech also, inasmuch as there is no constant relationship between hearing distances for whispered and conversational voices, and, besides, it is most important to hear the conversational speech in social life. In forensic practice and for army recruiting purposes, for instance, the hearing-power ought to be tested with regular conversational speech.

At the International Otological Congress in Budapest I suggested the name "index vocalis" for the ratio between auditive distances for whispered and conversational voices. Thus, *i. v.* the index vocalis, *v.* the distance for whispered voice, *V* the distance for conversational voice, we could assume a general formula: $i. v. = v/V$. In other words, the index vocalis would be represented by a fraction, where the numerator expresses the hearing-distance for whispered voice and the denominator the distance for conversational voice.

Finding the value of such a fraction may prove useful: 1. Practically just to get an idea of the hearing-capacity of a patient in social life. 2. Clinically, as a hint for diagnosis: We may anticipate indeed that the different diseases of the auditory apparatus will behave in different ways as to the ratio between the auditory distances for these two kinds of speech.

To make the test as simple as possible, I proposed that only vowels and even only the five fundamental ones: *a e i o u*, as pronounced in the Italian language* be employed.

A number of experiments out of doors and in practically noiseless places were carried out by the writer to determine the hearing distances for vowels uttered in whispered voice of medium in-

*A as in father; e as in very; i as in winter; o as in lord; u as in rule.

tensity and in regular conversational voice. I found that, in the open, the average normal distance is 15 to 20 meters for the vowels *o a e i*, and only 4 to 6 meters for the vowel *u*. As for ordinary conversational voice the figures given by Wolf in his classical work appear exaggerated according to my researches: I found, through repeated investigations, about 100 meters for the vowels *o a e i*, and about 80 meters for the vowel *u*.

Now we are enabled to figure the average normal value of the vocal-index, as it results when measured in the open. For the vowel *u*: $5/80$ to $6/80=1/16$ to $1/13$, an average of $1/15$; for other vowels, *o, a, e, i*: $15/100$ to $20/100=1/6$, 60 to $1/5$; an average of $1/6$.

Be it understood that only approximate figures are obtainable no matter how simple and accurate the test may be made.

In clinical practice the determination of the index vocalis is difficult, for it is impossible to exclude the other ear, even in spite of hermetical closure, when its auditis is a sufficiently good one. Gradenigo and Stefanini studied several methods to prevent the non-involved ear from hearing conversational voice at all, or, at least, to reduce the ear's auditive distance for conversational speech under 5 meters, but they did not yield satisfactory results. In spite of such limitations, the research of the *index vocalis*, when possible, proves of great practical value in clinical work. The following possibilities may be expected:

1. All vowels uttered with whispered voice of medium intensity are perceived at a distance of 5 meters or more: the index cannot be determined indoor in such cases.

2. All vowels, or some of them, are perceived at a distance of under 5 meters, with whispered voice; with regular conversational voice all of them are heard at 5 meters and perhaps more. Then the index vocalis is undetermined, but it may be represented by a fraction having as numerator the measure in centimeters of the auditive distance for a certain whispered vowel, and as denominator the symbol 500 (more than 5 meters).

Let us suppose, for instance, that all vowels, except the *u*, be heard and, of course, repeated by the patient at 5 meters and perhaps more, and that the *u* be caught and repeated at a distance of 2 meters: The index vocalis for the vowel *u* would then be represented as follows: (*u*) $i v=200$ greater than 500.

All vowels, or one or more of them are heard at distances of under 5 meters, i. e. at distances easily estimated in a consulting room.

In such cases two extreme values of the index vocalis are likely to be found: one which approaches very close to the unit without attaining it, and another one represented by a very small centesimal figure. Here are two examples:

In some professional affections of the labyrinth the vowel *i*, whispered, is heard only very close to the ear, let us say, at two centimeters: the same vowel uttered in conversational voice may be perceived at four and a half meters. Then the index vocalis would

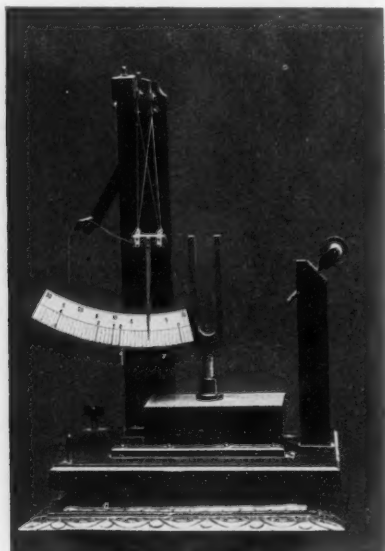


Figure 1.

be: (I) $i. v = 2/450 = 1/225$, which value is far smaller than the average normal index for vowel *i*, ($1/6$, as said above).

In certain forms of dry catarrh of the middle ear, the vowel *a* may be heard, when whispered, at a distance slightly shorter than when pronounced with conversational voice,—let us say 2 meters for whisper and 3 meters for conversational voice. The index vocalis would be: (A) $i. v = 200/300 = 2/3$. The determination of the vocal index is of peculiar importance in medico-legal statements: hence an out-of-door test is to be highly recommended in forensic examinations.

Any time the indoor tests cannot lead to a satisfactory determination of the index vocalis, I should suggest to state the auditive distances for each single vowel, uttered with whispered voice of medium intensity, as even this test can yield valuable hints for a diagnosis. As to height of pitch the vowels may be arranged as follows: *u*, *o*, *a*, *e*, *i*; *u* is the lowest, *i* is the highest pitched. We do not care to analyze now the exact tonality of the vowels, inasmuch as most experimenters do not agree about this difficult question.

When the hypo-acousis is due to an affection of the sound-transmitting apparatus, the perception of the lowest tones is outmost impaired: thus the vowel *u* being the lowest pitched, it will be also the least audible; the perception of high tones, and for vowels of the *i*, is chiefly impaired in diseases of the perceiving apparatus; in mixed forms the perception of the *u* and *i* will prove deficient; while a rather satisfactory hearing power could be ascertained for medium pitched vowels, i. e., for *o*, *a* and *e*; in severe labyrinthine diseases the auditive defect might be very evident for the vowel *e*, which, as to pitch, approaches *i* the nearest.

The vowel test is exceedingly simple: it eliminates, on the patient's side, any psychical and intellectual interference; furthermore it is available in any language and country.

B. Tonal tests: A really scientific development of otological physio-pathology cannot stand on other ground than correct determination of the hearing for the different tones of the musical scale. Yet, by taking as a measure the mere duration of the sound of a vibrating tuning-fork, i. e. the time while its sound is perceived by the diseased ear compared with the duration of the perception for the same sound by a normal ear, only deformed images of the patient's hearing power are obtained. It is true that even such deformed representations may give some coarse idea of the hearing capacity in most cases: nevertheless they are always far from being correct. Likewise, considering the deformed optical images given by cylindrical mirrors, concave or convex, we could easily tell a fat short man from a thin tall one, but we would not take the man's picture from such an image.

Professor Stefanini and the writer have tried to find a method of acoumetry that would be physically correct and on the other hand would comply with the requirements of practical work.

For medium and high-pitched tones we use tuning-forks. As every tuning-fork has its own characteristics as to duration and in-

tensity of the sound, it is necessary to find them out before using the fork: in other words the fork itself must be previously tested with a normal ear (standard test).

Our method for tuning-forks is quite simple and stands on two fundamental rules, very easily remembered: 1. For a given tuning-fork, the work to be done, i. e. the power required to obtain a defined initial intensity of the sound, is proportional to the square of said intensity. Thus to get from the same tuning-fork the intensities of sound equal to 1, 2, 4, we must use percuting powers equal to 1, 4, 16, respectively.

2. When the initial intensities of the sound increase in the progression 1, 2, 4, the increase in duration of the sound from one

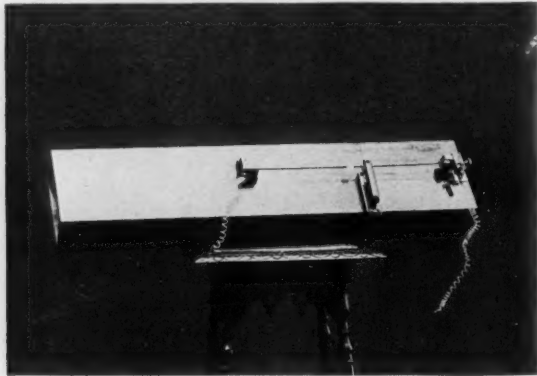


Figure 2.

intensity to the next, is constant: i. e. the duration of the sound increases proportionately in seconds from intensity 1, to intensity 2, as from 2 to 4, and so on. The calculations upon which the above quoted rules stand, have been discussed in detail by Professor Stefanini: besides, these rules are fully demonstrated experimentally. Our acoumeter consists essentially of a tuning-fork; the low and medium pitched forks are mounted on a proper resounding box. The fork is so placed that it can be struck by a wooden pendulum bearing a metal percussor; the pendulum has a quadrifid thread suspension device, which, besides being inexpensive, permits the pendulum to strike the fork always in an uniform way. Lateral deviations and friction resistances, which latter are likely to change owing to several circumstances in pendula oscillating on a metallic suspension, are thus

avoided. The different heights, where the pendulum may be let go from, are read on a graduated arc that follows the trajectory of the pendulum, as shown in Figure 1. The heights corresponding to the initial intensities 1, 2, 4, are marked in red on said scale of our acoumeter.

The sound obtained is audible even at some distance: there is no need of any conveying apparatus. Hence we eliminate the causes of error when the prongs of a vibrating fork are brought close to the meatus, or when the sound is conveyed to the ear through rubber tubes. We should advise placing the fork only half a meter from the ear to be examined at; this will prevent the phenomena of resonance or of acoustic interference affecting the results, as we stated happened in usual tests, and especially when almost pure tones are employed.

The best way to ascertain the peculiar qualities of a given tuning-fork as to duration of perceptibility of its sound for normal ear, that is to standardize such fork to enable us through it, by comparison, to ascertain the hearing power of a pathological ear, is to use a graphical method, as for temperature charts. Here, instead of temperature, degrees, days and hours, we should register the different durations of the sounds in seconds, and the different powers employed; we place the durations on a vertical line, and the powers, proportional to 1. 2. 4., on a horizontal line, using cross section paper with small squares of one square millimeter. The powers must be inscribed at a distance of 10 mm. from each other, in order that Prof. Stefanini's table, where final results are readily figured, may be used.

As the tuning-fork test for normal ears (standard test) is not exempt from difficulties, which would take too long to discuss here but which do not depend on the method itself, it is advisable to take as standard the average result of several examinations.

Now let us assume we have marked on the cross-section paper the results given by a normal ear, that is the results of a standard test: let us suppose also that in such record a duration of perception of 20" corresponds to power 1, one of 25" to power 2, one of 30" to power 4, and so on (as stated above, when intensities are successively doubled, the duration of the sound increases in a constant rate); then by drawing on the chart a line connecting the corresponding marks, we shall get a straight line which is called a "logarithmic straight line."

Let us suppose now that in a patient the sound provoked by the power 2 be heard only during 10", in stead of 25" (normal): we

mark this result on the chart, and then we count how many small one sq. mm. squares are lined horizontally between the mark and the logarithmic straight line or its prolongation; consulting the above-named calculation table, we shall find out the corresponding value of hearing power for said tone and for said intensity. In the present instance the number of the squares would be 30, and the corresponding degree of hearing power given by Stefanini's table is 0,12.

Our acoumeter is intended for determination of the hearing in the musical compass of the tonal scale. We suggest using for the deep part of the scale the 64 double vibration and the 128 double

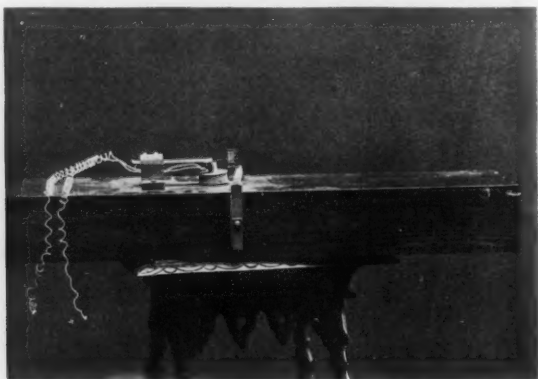


Figure 3.

vibrations: for the medium part the tone c^2 (512 v. d.) and as high notes c^4 of g^4 , both which do not require any resounding box.

It is unnecessary to point out that by means of the data obtainable from accurate examination of the hearing in these three zones of the compass, and by stating also both its inferior and superior limits of audibility, we are enabled to state and to represent readily, even in common practice, a quite correct "campus auditivus."

Considering that the initial intensity of the tones of low-pitched tuning-forks is usually too small, no matter if a resounding box is used or not, Prof. Stefanini and the writer lately thought of using a very simple apparatus instead, Figure 2. A metal ribbon stretched between the poles of a magnet and mounted on proper resounding box, starts to vibrate as soon as an alternative electric current is sent through it, provided that the tension of ribbon, which can be regulated by means of a screw, be such that the tone given by trans-

versal vibrations of the ribbon has the same "period" as the alternative current. Latter must be reduced, of course, to a convenient intensity through a rheostat; the vibration of the amplitude depends on the intensity of the current, and is therefore regulated by the rheostat.

In Lucca this apparatus yielded the a of the large octave (108 v. d.; length of wave m. 3, 126): the tone given by the street current in Turin was of 90 v. d., about the fa^2 (or fis) of the large octave, with a wave's length of about 3,718 meters. The intensity of the sound is judged by the amplitude of vibration of the ribbon, made apparent by means of a device of the writer's optical method.

In another instrument of ours we obtain a sound from a metallic plate or lamina, set on vibration by means of an electro-magnet connected with alternative current. The amplitude of vibration and, subsequently, the intensity of the sound is shown on a millimeter scale through a thin wire attached to the plate.

Both these instruments produce almost pure deep tones, with a greater maximum intensity that it is obtainable from tuning forks. If alternative current is not at hand, and only direct current is available, it is quite simple to transform the latter into an alternative one by means of the usual rotative transformers employed for endoscopy, and then to operate through it either the ribbon or the lamina of the above described apparatus.

STEFANINI'S CALCULATION TABLE.

Million	Hearing power	Million	Hearing power	Million	Hearing power
m/m 1,—	0,93	m/m 16	0,33	m/m 42	0,054
1,5	0,90	17	0,31	43	0,051
2,—	0,87	18	0,29	44	0,047
2,5	0,84	19	0,27	45	0,044
3,—	0,81	20	0,25	46	0,041
3,5	0,78	21	0,23	47	0,038
4,—	0,76	22	0,22	48	0,036
4,5	0,73	23	0,20	49	0,033
5,—	0,71	24	0,19	50	0,031
5,5	0,68	25	0,18	55	0,020
6,—	0,66	26	0,16	60	0,015
6,5	0,64	27	0,15	65	0,011
7,—	0,62	28	0,14	70	0,008
7,5	0,59	29	0,13	75	0,005
8,—	0,57	30	0,12	80	0,004
8,5	0,56	32	0,11	85	0,003
9,—	0,54	33	0,10	90	0,002
9,5	0,52	35	0,09	100	0,001
10	0,50	36	0,08	105	0,0007
11	0,47	37	0,077	110	0,0005
12	0,44	38	0,072		
13	0,41	39	0,067		
14	0,38	40	0,062		
15	0,35	41	0,058		

**TREATMENT OF PERSISTENT OTORRHEA IN INFANTS
AND YOUNG CHILDREN BY THE ESTABLISH-
MENT OF POST-AURICULAR DRAINAGE.
PRELIMINARY REPORT.***

DR. WENDELL C. PHILLIPS, NEW YORK CITY.

The term persistent otorrhea in infants and young children, as herein used, applies to those cases in which an acute purulent inflammatory process invades the middle-ear spaces and continues without abatement for an indeterminate period after the usual five to thirty days, which ordinarily may be considered as its normal course. This type of purulent otitis media should be differentiated from that other and rather common class which may be termed recurrent, in which recovery takes place from each attack only to be followed by recurrences at varying intervals usually as a result of an acute rhinitis. Children of the latter class are invariably the victims of hypertrophied tonsils and adenoids and their attacks usually cease upon the removal of these offending tissues. The recurrent type, therefore, is to be eliminated from this discussion, unless the otorrhea finally becomes persistent and chronic. A typical case of persistent otorrhea, of the type under consideration, presents a history somewhat as follows: Consequent to such form of infection which involves the upper air-passages, such as grip, the exanthemata or pneumonia, an acute middle-ear suppuration appears. Weakened by the primary general infection, the child's resistance is lowered and in many instances some underlying dyscrasia, known or unknown, adds its quota to the lowered resistance. From the outset, the discharge is profuse, persistent, and of a character which plainly bespeaks a severe type of infection. The usual diminution in quantity which in ordinary cases appears from the third to the seventh day, does not take place, but the temperature becomes normal, or nearly so, pain is not present thereafter and there may be no marked drooping of the postero-superior canal wall. The usual local measures of treatment consisting of paracentesis, cleansing, cathartics and rest in bed may have been carried out in full, although in many instances clinic patients have received no treatment at all.

It soon becomes evident that the small tympanic cavity proper could not secrete the amount of pus which flows from the ear, and

*Read at the meeting of the American Laryngological, Rhinological and Otological Society, Washington, D. C., May 9, 1913.

one is forced to the conclusion that the aditus and mastoid antrum at least must be involved. It is evident that such a discharge continued beyond about the third week furnishes evidence that the case is rapidly becoming chronic and calls for a different form of treatment.

It is true that proportionately a large number of persistent otorrheas are found among the poor and ill-nourished which apply for hospital or dispensary treatment.

Of the underlying dyscrasias which almost invariably prevent nature's efforts, aided by efficient local treatment, from affecting a cure of acute purulent otitis media, tuberculosis and syphilis are the most stubborn to deal with and all writers agree that a considerable proportion of the chronic otorrheas are tuberculous in character. In these, local drainage from the membrana tympani does not seem to avail, and the disease progresses for long periods, and often with serious and fatal complications. Inanition from other causes also commonly results in delayed cure. Severe types of infection, such as diphtheria, measles, pneumonia and grip are obstacles difficult to overcome. In many of the latter cases, however, there is a more or less rapid development of positive mastoid symptoms, hence, they are not to be considered in this discussion.

Treatment:—Regarding the treatment, we do not advise any operative interference until all reasonable local measures have been faithfully carried out, this to include free drainage by paracentesis, a clean regime of local treatment and attention to hygiene and the general health. In certain patients who are the victims of markedly hypertrophied tonsils and adenoids and the purulent otitis has progressed beyond the temperature stage, it may be wise to delay post-auricular drainage for a short time and remove the tonsillar and adenoid masses. All these measures having failed, the wisdom of surgical interference must be considered, and in the writer's opinion, the quickest, safest and most rational measure to pursue is to establish post-auricular and, hence, through and through drainage by means of the simple mastoid operation.

The reasons are as follows: 1. It quickly terminates an otherwise persistent otorrhea. 2. It insures against an extension of local bone necrosis. 3. It prevents the case from becoming a chronic purulent otitis media, with all that the name implies regarding a chronic offensive discharge, loss of hearing, bone necrosis and possible serious and fatal complications. 4. Finally, the most important reason is, the restoration and retention of the hearing-function.

It need not be added in this connection that this operation is not a dangerous one, neither is its slight seriousness to be compared with the dangers and discomforts attending a chronic aural discharge.

In the considerable number of operations which have been performed by myself and assistants, I have been surprised at the frequency with which the pus escapes under pressure through the opening made into the mastoid antrum. Granulation-tissue is also present, and in several cases an exposed sinus or dura has been found. These cases, when operated upon, have complained of discharge for from six weeks to five years. In the more chronic ones, the simple mastoid operation has sometimes proved insufficient and the radical mastoid operation has become necessary. In a few cases a similar procedure has been employed in adult patients and one or two reports of these may come out in the discussion.

It may be stated, however, that in young children, when performed any time between four weeks and three months, the results have been most favorable.

In a subsequent paper, I hope to give definite statistics of value. Others of our members no doubt hold the views herein outlined and it is hoped that these somewhat desultory remarks may bring out a valuable discussion.

40 West Forty-seventh Street.

Suggestions on Phenol and Ichthyol in External Otitis. J.H.NELSON, *Jour. A. M. A.*, March 8, 1913.

Nelson reports exceedingly good results from the use of a mixture of phenol and ichthyol in glycerin in otitis externa diffusa and myringitis, otitis externa circumscripta ("furuncle of canal") and in connection with other treatment as good as in ear-drops in acute otitis media, and especially good in otitis externa caused by complicating chronic suppurative otitis media. Tampons soaked in this solution and used as packings in connection with 2 per cent boric irrigations were used with splendid results in a series of cases averaging from 1,000 to 1,200 per month during one year at the eye and ear clinic, Colon Hospital, Cristobal, Canal Zone.

DIFFERENTIAL DIAGNOSIS AND TREATMENT OF ACUTE LABYRINTHITIS.*

DR. L. L. HENNINGER, COUNCIL BLUFFS, IOWA.

In looking over the recent otological literature we are impressed with the volume of space devoted to the discussion of the labyrinth and allied structures in the comparatively short space of time since the attention of the medical fraternity has been directed to this particular field of scientific knowledge by the researches of Jansen, Barany and others.

With the experimental and clinical findings of Barany in the almost unlimited material at his command in the Urbantschitsch Clinic, Vienna, originated the first intelligent conception of the mechanism and importance of nystagmus in vestibular disease, and his discoveries in this field at once gave impetus for further original work along the same line, and this impetus has shown no appreciable abatement at the present time.

To Jansen who first suggested the opening of the labyrinth as a means of combatting the further progress of a purulent invasion of this deeply situated organ, and to Barany who is the acknowledged pioneer in the development of the means of diagnosis, however, is due the greater credit, and to them also is due the homage of the profession for their valuable contributions to the annals of otology.

Notwithstanding the wealth of literature on the subject of labyrinthitis, the various writers heretofore have signally failed to agree upon a definite attitude and course to pursue once the symptoms of this disconcerting complication makes its appearance.

Gradually, however, the consensus of opinion begins to crystallize into more definite and harmonious knowledge and the ideas of individual observers more frequently coincide. With the advent of better operative technic and more accurate means of diagnosis and differential diagnosis, grows apace a lower mortality rate and a more hopeful prognosis from operative interference where such is indicated.

Acute labyrinthitis may be either of a serous or a purulent nature and arises from an invasion of the labyrinth by some extraneous agent, either toxins or pathogenic germs, and may be

* Read before the Omaha Ophthalmological and Otological Society, February 20, 1912.

either diffuse or circumscribed. It arises as a complication in acute or chronic suppuration of the middle ear and mastoid, and also during the course of severe general infections, as diphtheria and scarlatina. It spreads to the internal ear through the oval or round window by direct extension or through a fistula in the bony walls, the result of erosion and necrosis incident to the severe suppurative process.

The onset of labyrinthine invasion in typical cases is characterized by certain definite symptoms, modified of course in individual cases by the severity of the general symptoms and the character of the infective agent. In serous labyrinthitis the onset may be sudden or gradual, the temperature may be normal or slightly elevated; pulse usually rapid. The patient often complains of tinnitus, dizziness, nausea, and disturbance of equilibrium. The hearing is greatly reduced, but the vestibular apparatus responds to stimulation. Spontaneous nystagmus is present and is directed toward the diseased side. This is in the early stages or in mild cases with a gradual onset. Those cases of sudden onset present a picture difficult to differentiate from the purulent type.

Facial paralysis may exist as a complication and is due to a serous exudation around the perineurium or in the nerve itself. Recovery is the rule.

The advent of purulent labyrinthitis ushers in a long train of symptoms, nausea and vomiting, fever (possibly already present from the primal disease), headache, tinnitus (early), deafness later, nystagmus, loss of labyrinthine irritability and vertigo. The onset is usually sudden and marked by a distinct rise in temperature, often accompanied by facial paralysis. The nystagmus is directed towards the diseased side at first, but as the disease process advances and the end-organs of the vestibular nerve lose their function, the nystagmus is directed towards the sound side. This action is explained by some authors as an evidence of increased irritability of the sound labyrinth. The vertigo and disturbance of equilibrium continues for several days, and the patient unable to assume the erect position, lies on the side towards which the nystagmus is directed, as in this way he experiences less subjective sensations from the nystagmus. This is due to the fact that the distressing symptoms of vertigo, nausea, etc., are increased when looking toward the side of the rapid component, hence in the position as stated above he must look away from the direction of the nystagmus and the discomfort is thus lessened. All efforts to stimulate the vestibular apparatus by turning, application of the caloric

tests, etc., are futile of results. By applying Neuman "Laerm-apparat" to the sound ear, the diseased ear is found to be incapable of detecting the most penetrating sounds. In cases with favorable termination the symptoms abate after several days, the subjective symptoms disappear and vertigo is only experienced on suddenly turning the head. Nature has thrown up protective barriers in ten or fifteen days, spontaneous nystagmus disappears and the vestibular apparatus passes into a state of latent destruction.

As a complication incident to a purulent labyrinthitis, meningitis may supervene, also a cerebral or cerebellar abscess,—the latter being by far the most frequent, owing to anatomical structure and intimate relation of the parts. Sinus thrombosis by way of the superior petrosal is not uncommon.

Cerebellar invasion may be brought about in the following ways: (1). Through the aqueductus vestibulae. (2). Through the aqueductus cochlea. (3). By way of the internal auditory meatus. (4). Forus accusticus internus and internal auditory meatus. (5). Fistula in the semi-circular canal.

When considering the course, prognosis, and tendency to complications of labyrinthitis, the importance, in my opinion, of the nature and virulence of the infective agent in relation to the anatomical and clinical course of the labyrinthitis has not, up to the present time, been properly appreciated. Although investigations in connection with the microbes concerned with the suppurative processes of the brain have not been lacking, I have been unable to find much in the literature of the subject that suggests that the histo-pathology and clinical peculiarities of labyrinthitis are essentially related to the nature of the bacteria. Thus the diplococci with their characteristic peculiarity of producing an abundant secretion of fibrin in the blood would be more prone to localize the process by throwing up the protective banks of fibrin material which contains numerous polynuclear leucocytes.

The existing channels of communication between the labyrinth and the brain and meninges are minute and this action in a germ of not too virulent nature would in many cases prove effective in staying the process. Again, the capsulated bacteria, while none the less destructive, are slower in their action and consequently less violent in onset, giving nature an opportunity to throw up these barricades, which means so much in limiting disease.

Acute purulent labyrinthitis must be differentiated from cerebellar abscess, as nystagmus is such a prominent feature in both conditions. According to Neumann, we may assume that if nystagmus

towards the affected side exists, it may be due to a beginning or circumscribed labyrinthitis or a cerebellar abscess. The irritability of the labyrinth in circumscribed labyrinthitis is frequently still intact, but in this case we would have the fistula symptoms,—increased density or rarefaction of air-pressure produces nystagmiiform ocular movements. On another case irritability on irrigation is abolished, but at the same time nystagmus is produced by direct pressure and by galvanic current.

Under these circumstances, according to the same author, a cerebellar abscess cannot be excluded prior to an operation on the labyrinth. He performs the con-joint radical mastoid and labyrinth operation. After the labyrinth operation, the nystagmus, if due to the labyrinth must incline towards the normal side. If, however, in such a case after the labyrinth operation the rotatory nystagmus should be directed towards the diseased side, an immediate diagnosis of cerebellar abscess can be made, as a destroyed labyrinth never in uncomplicated cases results in nystagmus towards the same side. I mentioned earlier in this paper that given a destroyed labyrinth on one side, nystagmus toward the normal side proceeds from the normal labyrinth on the opposite side. If, subsequent to the labyrinth operation, the nystagmus is still directed towards the diseased side, it must proceed from the cranium, owing to irritation of Deiter's nucleus or the nervus vestibuli of the brain.

Again, given a nystagmus towards the sound side, and the labyrinth not irritable, the ocular movements in this case may originate either from the labyrinth or from the cerebellum. If due to the labyrinth it will subside in the course of a few days while in the same time, if due to cerebellar abscess, it would be increased.

Bárány, in a series of articles representing much original experimental and clinical observation, has proved that in intra-labyrinthine affections the kinesthetic sense has been in no way interfered with, the body responding in an orderly way to the nystagmus produced, whereas in cerebellar abscess or tumor there is a marked disorder in the motions of the body which accompany the nystagmus. Thus if one produce a nystagmus by turning a normal person to the right with his head erect facing to the front, he will fall to the right; if his head be turned 90° to the left, he will fall forward and so on, showing that the nystagmus is produced in the plane of the particular semi-circular canal which is placed in position to be stimulated by the rotation of the chair, and the direction of falling corresponds thereto. If the vestibulo-cerebellar tract has been interfered with, for instance in cerebellar abscess or tumor, the direction of

falling has nothing to do with the position of the head, falling always in the same direction. This is a valuable aid in diagnosis. Bárány showed that an interference with the cortex of the cerebellar substance will produce an abnormal innervation for the pointing movements of the extremities. Normally a person in whom nystagmus has been produced to the left, will, upon closing the eyes and endeavoring to point to some near object whose location has been previously determined before closing the eyes, point considerably to the right of it. In disease in the right cerebellar cortex, the right finger will point directly at the aforesaid object regardless of the vestibular irritation, while at the same time in the same person, the opposite side with intact cerebellum will be influenced by the induced nystagmus.

Nystagmus is often found in multiple sclerosis, in Friedrich's ataxia, syringo-myelia, and in the neurotic and hysterical, but here the differential diagnosis presents no particular difficulties and will need no further comment than a passing mention.

Given, therefore, an undoubted diagnosis of acute labyrinthitis, what, in the interest of the patient, is to be our course of procedure? Plainly, all cases are not operative and the trend is towards conservatism. The advent of serous labyrinthitis calls for the appropriate mastoid operation, possibly the simple, probably the radical, following which the patient is closely watched for subsequent manifestations, testing the functions of the internal ear frequently.

Cases with labyrinthine symptoms following acute mastoiditis or an acute exacerbation of a chronic process should be at once put to bed after the eradication of the primary foci and kept absolutely quiet. This treatment shows a lower mortality record than the former custom of treating them in many instances as ambulatory cases. Absolute rest in bed must be rigidly enforced.

During this period meningeal symptoms must be diligently watched for, according to Kopetzky, and at the first sign of their onset the labyrinth operation performed. This practically coincides with the views of Rutin that although the unfavorable course may not be checked in the vast majority of cases, nevertheless the timely operation has proved successful in not a few instances even in cases so far advanced as to exhibit turbulent and even purulent fluid upon spinal puncture. Jansen does not always await meningeal symptoms. He holds that the caloric reaction has often not disappeared at the precise time when the surgeon would have the favorable opportunity of staying the process by surgical interference. However, there are few authors at the present time who will advocate operat-

ing on a labyrinth whose functions are not absolutely destroyed. Later developments may modify this view.

Circumscribed labyrinthitis is to be treated by expectant measures. The contra-indications to operative opening of the internal ear in these cases are based upon the fact, shown by pathological anatomy and proved by clinical observation, that in a large per cent of such cases where the process is limited to segments of the internal ear, protective barriers are thrown out to limit further advance of the infective agent; thus permitting spontaneous healing. Surgical interference here would be not only unnecessary but absolutely unjustifiable and dangerous.

Sinusitis Frontalis Acuta and Iridocyclitis Acuta. E. KELLNER, *Monatschr. f. Ohrenh.*, Heft 2, 1913, p. 237.

Case of acute suppuration of the left frontal sinus accompanied by iridocyclitis of the corresponding side. Two days later suppuration in right frontal sinus with right-sided iridocyclitis. Cure after five weeks. Kellner emphasizes the necessity for a combined ocular and nasal therapy. Ed.

Prevention of Deafness. W. SCHEPPEGRELL, *New Orleans Med and Surg. Jour.*, Oct., 1912.

Normal hearing, like other valuable gifts, is rarely appreciated until it is lost. In advanced cases of deafness, it is not only a great disadvantage, barring the subject from many vocations and enjoyments, but is also the cause of much unhappiness from a social standpoint. Every safeguard should, therefore, be placed around this valuable sense, and not only should early symptoms of ear diseases be given careful attention, but also affections of the nose and throat on account of their influence on the organ of hearing. When this shall have been done, it will not be many years before the present large ratio of defective hearing shall have been materially reduced. A. A.

SOCIETY PROCEEDINGS.
NEW YORK ACADEMY OF MEDICINE.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

Regular Meeting, January 22, 1913.

JOHN F. MCCOY, CHAIRMAN.

(Continued from page 719).

DISCUSSION OF DR. DOUGLASS' PAPER.

Dr. DOUGLASS said that he fully recognized the danger of presenting before this section any cases of cured malignancy, and that he had anticipated the very criticism that he had received, and since the cases had been so thoroughly discussed he would be willing to substitute the term "apparent cure" until time disproved or justified his first claim.

He had never before dared to present a case of sarcoma of the nose even as "apparently cured," but in this case he really felt confident of a successful issue, and with a due consideration of all the hopelessness about these malignant cases he feels justified in maintaining an optimistic position, and believes that we are going to succeed in curing these cases by and by. The younger men will do it.

1. Tumor of the Larynx. 2. Falsetto Voice. By Dr. GLOGAU.

Case 1: Dr. GLOGAU said that he hardly felt justified in making a diagnosis in this case, but simply presented it as a tumor of the larynx. The man had been operated upon over twenty years ago by Prof. Krause of Berlin, who said that it was analogous to the tumor removed from the vocal cord of the Emperor Frederick. Dr. Geitman saw the patient some time ago, when the patient was almost unable to speak. The tumor apparently the size of a cherry, is situated at the anterior commissure right beneath the epiglottis. It looks very vascular, bleeds easily at the touch of the probe. Indirect laryngoscopy, pharyngoscopy and also Bruening's direct laryngoscopy have been tried. The tongue is very fleshy and the epiglottis is way back so that it is almost impossible to bring the anterior commissure into view. One could only see the middle of the vocal cords. He had finally persuaded the patient to enter the hospital, and intended to try to remove the tumor by suspension laryngoscopy.

There is some reason to believe that it is a recurrence of a carcinoma, not only from the history but also from the appearance of the tumor, the fact that it bleeds so easily upon being touched, and its apparent extension upon the interior of the larynx. He had presented the case as being of interest before trying to operate by suspension laryngoscopy, as it will probably be the first case of this kind operated in that way.

Case 2: Young man, 20 years of age, when he first came under observation about one month ago he could only speak with a falsetto voice. Two and a half years ago his tonsils were removed and he lost

his normal voice immediately after the operation, and this condition persisted until his present treatment. He has been placed under the care of a teacher for vocal gymnastics, and has improved most wonderfully. There are not many such cases on record. Dr. Faulkner of Pittsburgh is writing a book on the tonsils and the voice. Dr. Glogau said that he had read of several such cases in literature.

One has to be especially careful in advising tonsillectomy in the cases of singers, and if there is subsequently a falsetto voice or some other change of voice, they may be benefitted by these vocal gymnastics.

DISCUSSION.

DR. QUINLAN asked if this young man was not about the age when the voice is expected to change anyhow?

DR. GLOGAU replied that the condition immediately followed the tonsillectomy and had lasted for three years, and had only improved since the voice-training had been instituted.

DR. SMITH said that he did not believe that the tumor was malignant, that if it was so it probably was malignant some twenty years ago when it was first removed, and at that time the patient would have been somewhat young to have warranted a malignant growth, though this is not a positive argument against it. A malignant pedunculated tumor is seldom seen, as he knew there were only three cases on record, one recorded by Fraenkel, one by Ballenger, and the other by Levy. The growth had all the characteristic appearances of an angio-fibroma. The location of the growth argued against the malignancy. He said that if the tumor had been malignant over such a long period of time more inroads upon the general health of the patient would have been made, although there have been cases on record which have gone for eight and even ten years without the necessity for major operative procedures. He thought that if the growth was malignant there would have been greater extension of its base to the tissues adjacent, and in this case the growth seemed to be attached distinctly to the border-line of the cord. As for the removal of the tonsils affecting the voice he believed that their removal generally favored improvement rather than otherwise, and that in young singers he had never hesitated to remove the tonsils, providing the existing conditions warranted their removal. He said that in old singers who had accustomed themselves to singing with the presence of enlarged or diseased tonsils he thought the matter should be considered very seriously before removing them. In the case presented by Dr. Glogau he believed there was some psychic factor existing for the condition of the voice, rather than that the removal of the tonsils influenced it.

Dr. Smith inquired whether it was not the anterior part of the larynx which it was most difficult to reach by suspension laryngoscopy. That in the article published by Killian, and that read by Freudenthal before the section, the posterior parts of the larynx were mentioned as the easiest to reach, and that the anterior part and anterior commissure was with difficulty brought into view.

DR. SIDNEY YANKAUER said that in cases which present unusual difficulties suspension laryngoscopy had proved very efficient. They had

done several operations on cases with complete stenosis and the arytenoid cartilage adherent to the epiglottis, and it was impossible to bring it into view, even under a general anesthetic; but with the suspension laryngoscopy, a probe had been passed, and by stretching and dilatation with a good sized dilator it had proved easy to examine and manipulate the case. The ease with which the parts can be brought into view by means of the suspension laryngoscopy is very remarkable and surprising to any one who has not seen it.

Dr. Yankauer said that it was certainly true that the anterior commissure was more difficult to observe than the posterior parts, and that was true with every method. Suspension laryngoscopy was nothing more than an automatic holder for the laryngoscope—the principle is precisely the same. The anterior commissure can be brought into view more easily, however, by suspension laryngoscopy than with direct laryngoscopy, because one can have more pressure; one has the whole weight of the patient's head, and perhaps of the chest, to press the larynx down, and the finger can be placed in and force it around, so that one can get a better view.

Dr. MacKENTY said that he had seen several cases of suspension laryngoscopy in Vienna during the past summer, with Marschik. He did not think suspension laryngoscopy gave as good a view of the anterior commissure as the bronchoscope, so that he was more or less disappointed in the result; at that time he had been using it all summer and thought that the instrument would have to be modified before it proved to be of great practical service.

Dr. MacPHERSON said that he had seen this case several years before, and now the growth was much more pedunculated. It was a case of subglottic tumor. He had never considered it to be a malignant tumor, and would certainly not have said that it was like the Emperor Frederick's case.

Dr. LEDERMAN said that he had a rather hurried examination of the patient's throat, and it seemed to him to be a benign tumor of the angioma variety. Whenever the patient tries to speak he forces the growth up between the cords and the latter cannot get together. There did not seem to be an infiltration. At one time he caught sight of a mass of growth below the cords.

Dr. GLOGAU said that the fact that it was apparently pedunculated and had no apparent infiltration does not disprove malignancy. He recalled a similar case which he had seen some time since and which turned out to be malignant. Dr. Smith himself had said that a malignant growth might remain for years in the same state without involving other structures. In the case of the boy he too first thought that it might be a natural change of voice, but it came so suddenly and followed immediately the removal of the tonsils and lasted until three weeks ago when he was put under vocal training, that it did not seem to be due to some psychic condition. But in any event, if such a change of voice should occur after a tonsillectomy or tonsillotomy it would seem to be well worth while to try the vocal training which had done so much in this instance.

Report of a Case of Phlegmon of the Epiglottis. DR. M. D. LEDERMAN.

(To be published in a subsequent issue of THE LARYNGOSCOPE.)

DR. GLOGAU asked if there was any history of foreign body, and received an answer in the negative. He then cited a somewhat similar case, caused by a foreign body.

Removal of Foreign Body from Left Bronchus. Removal of Foreign Body from Esophagus. Removal of Foreign Substance from Both Bronchi. DR. SIDNEY YANKAUER.

The first specimen was removed from the left bronchus of a boy of 5 years, who gave the following history: For four weeks he had had a cough with profuse expectoration and intermittent fever. Examination showed physical signs of consolidation and effusion on the left side; he had an evening temperature of 104° which came down in the morning. He remained in the hospital for a week, during which time the acute symptoms disappeared, but the physical signs did not clear up. A radiograph was taken and showed the presence of a foreign body on the left side, outside the mammary line. The parents were sent for, and upon questioning gave the history of the inhalation of a foreign body some five weeks previously. They had sent for a doctor but he thought it had passed down into the stomach and they had given the matter no further attention. This was the second case in which a foreign body was discovered without any previous history. In this case it happened that the substance was of a nature to give a dense shadow; in the other case it was a soft bone and gave no shadow.

On passing the bronchoscope the left bronchus was found filled with granulation tissue. After working around, a good deal of pus was expelled and the foreign body was seen and removed. The boy made a good recovery in about a week.

The second case had a somewhat similar history. The child was 2 years of age and was eating walnuts; he ran across the floor and fell; he began to cough and became cyanotic. A doctor was sent for who thought he was suffering from diphtheria and gave antitoxin. The cyanosis disappeared, but the attacks of coughing continued, and the cyanosis returned several times a day. After two weeks these attacks became so bad that the cyanosis was accompanied by convulsions. A laryngologist was then consulted who referred the case to Dr. Yankauer. The patient was anesthetized and the instrument passed, but the trachea was so swollen that it was difficult to pass a small tube, but this was eventually successful, and several small pieces of walnut meat were found and removed. From previous cases of this kind it was suspected that there might be other pieces which had escaped observation. The examination was difficult as there was a great deal of swelling, but eventually with the aid of cocaine and adrenalin the left bronchus was thoroughly cleaned out and the child made a good recovery.

In the case of the foreign body removed from the esophagus, the patient gave a history of eating chicken and suddenly feeling something solid in his mouth, which slipped down his throat. He immediately began to gag and vomit. He went outside and while bending over a basin his

teeth dropped out and disappeared. Eventually, as he thought, the piece of bone went lower down in his throat and stuck, and he had a good deal of pain and was unable to swallow. In brief, the history was that of swallowing a piece of bone while eating. On introducing a short esophagoscope, the obstruction was seen way down to the narrowing of the esophagus, but with a longer instrument some twelve or fourteen inches from the teeth a glistening white particle was found. This was grasped with the forceps and withdrawn with the esophagoscope as far as the cricoid when it slipped back. The esophagoscope was again introduced and the same thing occurred a second and a third time. Then the esophagoscope was again introduced and the foreign body seized by the bulb portion and brought up to the cricoid region, but even then it could not be brought out. There was a good clutch on the body, however, and by holding it firmly against the contracted muscle and overcoming the spasm, it was finally brought out. It proved to be a part of the tooth-plate, which had evidently been cracked off while he was eating. After removing the foreign body the patient was put to bed for twenty-four hours, after which the pain and swelling disappeared and he went home.

DISCUSSION.

DR. SMITH said that he wished to congratulate Dr. Yankauer upon the success of his work. He would also like to know where Dr. Yankauer was able to secure so many and such a wide variety of cases. He said in his hospital there had been comparatively few foreign-body cases and that the most of them were successfully removed. He said that in one of his own cases of foreign-body in the esophagus, the five-cent piece which was swallowed continued to precede the operative measures. That when the case was brought to the hospital the x-ray showed the coin to be in the upper part of the esophagus. He examined the esophagus first with a short instrument, and then with one sufficiently long to go into the stomach, but could find no evidence of the body. The second picture showed the coin to be in the small intestine and the third in the rectum. The fourth picture was unnecessary. Dr. Smith said that it was a well-known fact that the meat of a nut created more disturbance than any other foreign body, particularly that of the peanut. That there was great liability to pneumonia in these cases, and that Dr. Yankauer's method of evacuating the lower part of the bronchi by suction was one to be commended.

DR. MACKENTY said that the cases reported by Dr. Yankauer were certainly most interesting. He then told of an instrument in his possession intended for cutting in two a false tooth or other foreign body which will not come through. It was very small but a very strong cutting instrument, and he hoped some time to have a false tooth case upon which to prove its merits.

DR. MILLER inquired whether any other means of removing the foreign body had been tried before the bronchoscope. On being informed that no means had been employed, he said he had removed a wishbone after three weeks' lodgment in the right bronchus of a boy, by simply placing him head downward with percussion on the back. The entire side of a wishbone was extracted by placing one fist over the boy's back and

hitting it a sharp blow with the other fist, the first hand being placed as nearly as possible over the location of the retained bone. The boy's body was brought over the side of the bed with arms and head touching the floor. This was three weeks after the bone was swallowed while eating a piece of the breast of chicken during the telling of a joke by his brother. A shoe-button and a ring, which could not be seen, were dislodged by hanging the patients by their knees over the end of a brass bedstead and when they had drawn a full inhalation, a sharp blow was given the fist placed over the chest at the site of the bone, by the other fist. The button came as if it had been shot out of the patient, who was 7 years old, and had put the button which pulled off while attempting to polish his shoes, in his mouth, and had accidentally swallowed it. The child of 4 had swallowed a ring, which had fallen to the floor under a rocker and had been crushed out of shape. The mother tried to make him spit it out, but he tried to release it and in the frantic struggles of the mother it disappeared down below the point of feeling for it. In this case, three sharp blows on the sternum, and a sudden pull on the tongue dislodged it. These remarks in no way should deter anyone from using the bronchoscope so skillfully as doctors you know can, but we should give simple measures a chance.

DR. QUINLAN told of two instances in which he had removed the shell of a peanut from the bronchi by similar means as those described by Dr. Miller, by slapping the patients on the back and chest. The old-time ready-to-hand methods will often serve effectively. A few days previously he had seen a boy who had swallowed a small stopper which irritated his throat, but which was removed with an applicator.

Dr. Yankauer, however, had certainly done most excellent work for which he deserved a great deal of credit.

DR. SMYTH cited the case of a child of 3½ years, who seemed to have the foreign-body habit. The little girl had previously swallowed and retained for varying lengths of time, an intact grape, olive-stone, and shoe-button. Her last effort had been a penny, swallowed seven months before and located by the x-ray in the esophagus opposite the sixth dorsal vertebra. A Jackson tube was introduced, but before the penny had been located the light went out and could not be renewed, and then the foreign body was quickly and easily removed with the coin-catcher. The tube was the approved method, but the coin-catcher was simple and satisfactory.

DR. YANKAUER, in closing the discussion, said that in one of these cases the foreign body cast no shadow. In the other case there was a great deal of swelling around the foreign body and there was no time for delay. He thought that while such methods as those described by Dr. Miller and Dr. Quinlan would be quite proper at the time of occurrence, that where they have not proved effective there was no question about the value of the bronchoscope.

Demonstration of a Combination Pressure and Air Pump.

DR. SIDNEY

YANKAUER.

DISCUSSION.

DR. MILLER said that the instrument had been very greatly improved since he first saw it. The idea at first was to wash out the tonsils.

but this was finally given up as impractical. First, he tried the usual dentist basin suction syphon, but that not being strong enough, he tried circulation of medicated solutions through a continuous double flow by a reservoir placed six feet above the patient. He also had the opportunity of trying a pneumatic electric carpet-cleaner, whose suction, however, was too strong. About this time it became necessary to try some operative voices with sprays but found none continuous or strong enough until he explained his idea to Mr. Sorensen, who created a very small, yet reliable, electric pump with double cylinders, which was not only continuous but was able to produce just the right suction for tonsil and mouth moistening as a relief and cure for tonsillar disease. This machine was carried to Philadelphia for exhibition at the American Triological Society, May 13, 1913. It is so light in weight and small in size that I called it "The Midget," a suggestion that Mr. Sorensen was kind enough to apply to this beautiful, yet practical mechanism. It is in nowise like the Wappler pump, not but what the Wappler is good. I congratulate Dr. Yankauer for giving it the needed boost it deserves.

Regular Meeting, February 26, 1913.

Presentation of a Tonsillolith. DR. RENE H. HUVELLE.

Male, aged 55, consulted me for a sore throat which had existed for five days. Fifteen years ago he had had a similar sore throat, otherwise had always been in good health. No gouty or rheumatic history. Examination showed edema of right tonsillar area and soft palate, bulging of right lateral pharyngeal wall, and large, suppurating glands on same side of neck. Puncture of the pharyngeal abscess evacuated about ten ounces of pus. Next morning, the edema of the right tonsillar area persisted, but the pharyngeal abscess had somewhat subsided. Patient, in addition, complained of "hot piece of steel at root of tongue" on right side. Palpation revealed no hard mass. Several suppurating glands on the side of the neck were removed the same day. The next morning, while gargling, the patient felt a sudden sharp and severe pain, followed by a loose mass in the mouth, which he thought was a tooth. This mass was saved by the head nurse for examination. Immediately after this, the patient was able to swallow without pain. The site of exit of the stone was at the junction of the right anterior tonsillar pillar and root of tongue; it was easily seen and probed. The stone was not chemically examined. It weighed 11 grains, was 20 mm. in length by 6 to 9 mm. wide, and 4 to 6 mm. thick.

DISCUSSION.

DR. QUINLAN asked if he had understood correctly that several glands had been removed from the neck, and upon receiving a reply in the affirmative said that in an ordinary case of quinsy these are not usually suppurative glands in the neck, and he thought the removal of such glands was unnecessary at such a time, as it produced unnecessary annoyance to the patient and would leave an open wound which was liable to subsequent infection.

DR. HUVALLE replied that the gland-wounds were practically healed in three or four days without any infection and they were removed because they were suppurating.

Some Observations on the Voice Before and After Surgical Procedure.

DR. FRANK E. MILLER.

DISCUSSION.

DR. WILLIAM KELLY SIMPSON: The discussion of this subject permits of its being approached from at least two viewpoints. First, from a more intimate and technical standpoint, wherein are considered not only the general relation of muscular action in the control of voice sounds, but also the closer relationship of certain muscles, groups of muscles, and resonance cavities in their special jurisdiction over vowels, consonants, and their various combinations. In fact, we may say that the study of voice-production is, to a great extent a study of muscular action, and those whose vocation it is to teach voice-production, must have these anatomical combinations at their command.

I always recall with amusement the ignorance displayed in this respect by a certain teacher of singing who, in looking down the mouth of a pupil who was somewhat hoarse, said: "Ah, yes; I see that your vocal cords are somewhat congested this morning." How easy!

The study of voice-production, or its correction, hardly comes within the domain of laryngology. It is a study in itself, yet the laryngologist must stand guard over the physical well-being of the voice, going far beyond the mere mechanics and local conditions. His is no restricted area. Voice hygiene and general systemic conditions must alike be duly considered by him.

And this brings me to the second point of view of the discussion, viz., the relation of surgical operations in the upper respiratory tract to the improvement of voice-conditions. This is a subject of great magnitude and concern. It is the phase of the discussion which concerns most of us as practical laryngologists. I cannot enter into a minute discussion of operations on isolated areas and their effect on voice-correction. The relation of surgical operations to voice-improvement may be viewed in two ways. First, in those persons who have decided imperfections in voice due to some pathological condition. This may be found in the larynx itself, from the numberless conditions arising there which interfere with the voice; or we may have the various mechanical obstructions or hindrances to good vocal production, as seen by enlargement of the lingual or faucial tonsils and the adenoid tissue in the naso-pharynx, cleft palate, or in some marked intra-nasal condition, as seen in nasal polypi, unusual hypertrophy of the nasal mucous membrane, or markedly deviated septa. It goes without saying that removal of these conditions will have its effect in voice restoration and often without any further training as far as ordinary voice is concerned.

But when we are called upon to improve the true qualities of the *singing* voice by surgical interference, unless these morbid conditions exist it is, I should think, a matter in which we should be very careful in promising too much improvement, for we must remember that the perfection of the singing voice necessitates more than the mere mechanical ability to sing. There must also be a musical intelligence possessed by

the singer, a knowledge of the proper breathing, proper use of the singing mechanism, and musical interpretation as well. It is, indeed, difficult to produce a singing voice unless one already exists. Sometimes our efforts in surgical interference may produce an opposite effect from the one desired. This, I think, may be seen in some of the resulting adhesions and deformities following too rigorous attempts in tonsillectomy; and when this operation is performed on the person of a singer, great care and caution should be exercised in its performance. I am not in any way deprecating any attempts in preserving or improving the singing voice, but rather welcome any effort in that direction. Neither the laryngologist nor the vocal instructor can work alone; they must supplement each other and each should acquaint himself a little beyond his specialty. Keeping the singing voice in order is one of the first problems alike of the laryngologist and the vocal teacher, and each should yield to the other in those points which do not come within his immediate domain.

Dr. W. S. BRYANT said that Dr. Miller was very much in earnest in his endeavor to bring order out of chaos and put our ideas in regard to voice production on a scientific base. As he understood Dr. Miller's scheme, the various resonators were divided into groups, beginning in the nose and ending with the floor of the pelvis. These resonators are called autonomies, whatever that may mean. The theory is that certain organs act as resonators independently of all others. They are supplied by special nerves and muscles and act independently of the other resonators. This seems reasonable and removes much of the clouds which hang about the mechanics of voice production, and is a great step forward in the scientific understanding of the subject.

Dr. CHAMBERS said that certainly the young lady who had just sung so beautifully owed much to Dr. Mitchell, and that many persons would be almost willing to wear an artificial palate if it would enable them to do as well.

He was very glad to hear Dr. Miller speak of the function of the tonsil and of its capsule. Tonsillectomy is the fad for the moment. In the exuberance of their enthusiasm some operators remove tonsils which had better been unremoved.

Dr. HARMON SMITH said that just as he was entering the room, Dr. Miller had referred to the fact that the patient who had just been presented had been a patient of his, and that an operation had been performed upon the middle turbinate. He wished to correct the impression as to the nature of the operation, as he had performed a submucous resection and had not touched the middle turbinate structure at all, that there had been considerable vaso-motor rhinitis subsequent to the operation, and that he had endeavored to reduce this condition by palliative treatment, feeling convinced that subsequently ample room would be afforded for respiration after correction of the nasal deformity, but that the patient had been irregular in his attendance and had finally discontinued his visits altogether.

Dr. Smith said that he was absolutely opposed to the indiscriminate removal of any of the mucous membrane from the nasal cavities and that he held inviolate the turbinate structures as long as there was any hope of reducing them by other than surgical means.

(To be continued.)

PHILADELPHIA LARYNGOLOGICAL SOCIETY.

Regular Meeting, November 19, 1912.

DR. ROSS HALL SKELLERN, CHAIRMAN.

The Eustachian Tube in Chronic Aural Suppurations. DR. SIDNEY YANKAUER.

The performance of any operation with the highest degree of skill demands an excellent technic and a knowledge of the anatomy, not only as it is given in text-books but also as we see it in the living patient.

Technical skill is not so much a matter of the sense of touch (although an operation, such as I am going to describe to-night, is performed by what is called the sense of touch) as it is a matter of muscular sensation in the muscles of the fore-arm and hand, and as these muscles are developed differently in each individual, the muscular sense cannot be described. For this reason I have brought with me an anatomical specimen of the ear upon which I shall perform the operation.

In text-books the Eustachian tube is described as consisting of a cartilaginous and a bony portion, but from an anatomical, histological and clinical standpoint the cartilaginous portion belongs to the nasopharynx and bony portion to the middle ear.

The sharp transition between the floor of the bony tube and the floor of the middle ear largely disappears when the anatomical specimen is viewed in the normal position. For this reason I have suggested that the bony portion of the tube should be called the pre-tympanum to correspond to the epi-tympanum and the hypo-tympanum (illustrated on the blackboard).

It has been shown by Siebermann, Bondy, Heath and others, that a limited number of cases of chronic aural suppuration can be cured by a conservative-radical operation, which aims to restore the middle ear to a normal condition, and which must be considered successful only when it is followed by closure of the perforation in the drum membrane; for if the drum membrane remains open, a discharge from the ear will invariably persist or recur from time to time. When the Eustachian tube is open, perforation of the drum facilitates the passage of air from the nose into the ear during swallowing, blowing the nose, sneezing, coughing, etc. When the drum membrane is closed it is very difficult to blow particles of mucus into the ear, or even to inject fluids into the ear for therapeutic purposes by blowing them through a catheter. It is the drum membrane which protects the middle ear from infection from the nasopharynx. Therefore, in all cases of chronic suppuration in which restoration of the drum membrane is impossible, the Eustachian tube must be closed. This fact has long been recognized by otologists, and a radical operation is not considered complete, nor will it be successful except in a minority of cases, unless the Eustachian tube is closed.

What the speaker has done has been to devise an instrument by which the Eustachian tube can be closed without performing the radical opera-

tion, believing that thereby a considerable percentage of cases will be cured, and his experience with the closure of the tube in this manner during the past six years has been that sixty per cent of all cases, as they present themselves in practice, are permanently cured by this method. The fact that only sixty per cent are cured does not limit the indication for this operation to those cases in which it might be expected to accomplish a cure, for, even if it is known that the radical operation must subsequently be done, if the Eustachian tube has previously been closed, the infection of the ear will be diminished and the radical operation-wound will heal more kindly. If this were an operation which required a general anesthesia, and was followed by a period of rest in bed, one would hesitate, perhaps, to advise it in cases which seemed to be unsuitable for it, but as it is performed painlessly under local anesthesia and without unpleasant after-effects, it is justifiable in all cases.

The healing of any suppurative process requires the removal of the infectious agent, the bacteria, and the removal of the products of disease, the dead tissue, and the secretions. Moreover, the return of the bacteria must be prevented permanently, and the removal of the diseased products must be made continuous by perfect drainage. As the original source of infection in aural suppuration is the naso-pharynx, and as this region cannot be kept permanently free from infectious agencies, the closure of the Eustachian tube is indispensable for the prevention of re-infection.

The fact that a certain number of cases of chronic suppuration heal spontaneously, is evidence that efficient drainage can be established by nature, and the fact that cases spontaneously healed almost invariably show a sclerosis of the mastoid bone, and that in many of them the ossicles have disappeared, proves that spontaneous healing occurs even when the bone has been profoundly diseased. By a study of these cases we obtain our indications for the conservative treatment of the disease. Cases in which the amount of disease in the middle ear and mastoid cells is slight, get well quickest after closing the Eustachian tube. Cases in which the drainage from the middle ear and mastoid cells is inefficient will never get well until such drainage is established by surgical interference. In my own cases the time required to establish healing after closing the tube has varied from a few weeks to eighteen months; the average of all cases being six months.

The anesthesia for the operation is produced by making an application of 20 per cent cocaine, containing a little adrenalin, to the middle-ear cavity and to the pre-tympanum by means of the ordinary applicators. The pharyngeal side of the isthmus must also be anesthetized by applying the same solution by means of the Eustachian applicator through the catheter.

Closure of the tube is not always accomplished after the first curettement. The reasons for such failures are: first, inefficient curettement; second, adhesions of various kinds in the middle ear (diagrams made on blackboard); third, suppuration within the canal for the tensor tympani muscle. The canal can be opened and the muscles scraped out by means of the same curette.

It is sometimes necessary to remove the ossicles to obtain healing. The indications for ossiculectomy are necrosis of the ossicles, necrosis of the

outer attic wall, polypi originating in the attic, and the removal of the adhesions referred to previously. After organic atresia of the Eustachian tube has been established the ear is entirely independent of any changes, acute or chronic, which may take place in the naso-pharynx. The cure of the middle-ear suppuration has been unaffected by the attacks of acute rhinitis, acute suppuration of the accessory sinuses, ozena, nasal-polypi, etc.

The after-treatment is the same as the usual conservative treatment of middle-ear suppuration. When organic atresia of the isthmus has been successfully accomplished certain important changes of atrophic nature take place in the middle ear. Granulation tissue shrinks rapidly and polypi lose their tendency to recur, adhesions which have been cut do not unite again, the inner tympanic wall becomes pale, dry and leathery in appearance, and the perforation of the drum membrane never becomes smaller, but on the contrary, grows larger, so that after a few months all that is left of the drum membrane is a narrow white band attached in the annulus tympanicus. (Demonstration of operation on anatomical specimen.)

DISCUSSION.

M. B. GLEASON: Dr. Yankauer has demonstrated a method of closing the Eustachian tube which is probably feasible and safe in the majority of instances, but the proximity of the carotid should be borne in mind. In cases where I have inadvertently torn the lateral sinus, the rent has been caused by a spicula of bone and not an instrument. It would seem that when the artery was weakened, as the result of syphilis, or when the bone was necrosed or simply thin and fragile that there would be danger of wounding the carotid by this method of operating.

It is a well-known fact that within the nose, synechia occurs from simple contact of inflamed and swollen mucous surfaces. Probably the epithelioma disappears by pressure necrosis under such circumstances and the granulating surfaces then fuse together. The same thing sometimes occurs within the tympanum and probably also within the Eustachian tube, judging by the frequency of strictures seen in anatomical specimens when the drum had been destroyed by disease. When Neumann was demonstrating his method of performing the radical mastoid operation in Philadelphia a few years ago, I asked him what he did when he failed to close the tube. He answered that he first tried strong solutions of silver nitrate and that often this procedure was successful.

I should like to ask Dr. Yankauer if after the closure of the tube, the median wall of the tympanum finally became, as it is sometimes called "epidermized" with consequent great impairment of hearing, as after the radical mastoid operation.

DR. GEO. W. MACKENZIE: We have listened to Dr. Yankauer's able talk and demonstration on "The Management of the Eustachian Tube in Chronic Aural Suppuration." Those of us who have heard both Mr. Heath last summer at Boston, and Dr. Yankauer here to-night cannot help but compare the attitude of these two authorities on the subject of chronic aural suppuration. On the one hand Mr. Heath claims to be able to cure practically all cases of chronic middle-ear suppuration by the route of the

mastoid antrum, and with excellent results as to hearing, on the other hand, Dr. Yankauer modestly claims to be able to cure a fair percentage by the opposite route, i. e. through the Eustachian tube.

At the meeting of the International Otological Congress no one appeared to have been able to get Mr. Heath to commit himself definitely on anything, especially on the indication for his operation; while to-night, Dr. Yankauer in a concise and definite manner has pointed out to us the etiology and pathology of the factors which make for chronicity in cases of middle-ear suppuration.

It is my belief that there is a definite place for each of these operations, the choice of which depends upon the diagnosis, and only that diagnosis, which comprehends every feature of the suppuration, i. e. the location and character of the complication, or complications which tend to make the suppuration chronic.

I believe that Dr. Yankauer has hit upon an excellent idea for the treatment of a great class of chronic suppurations, and deserves every possible credit for his masterly efforts. I should like to ask Dr. Yankauer if, in those cases of closure of the Eustachian tube with new-formed membrane, he would advise his method of operation. It is in these cases that we not infrequently find associated cholesteatoma. I should also like to ask Dr. Yankauer if he has ever tried infiltration-anesthesia of the osseous external canal, as practiced successfully by Neumann and others since, in operations upon the middle-ear, notably ossiculectomy.

Since having been instrumental in bringing Dr. Yankauer here I wish to thank him personally for his coming, and for his very able and instructive discourse.

DR. GEO. M. COATES: I have been much interested in the work of Dr. Yankauer on the Eustachian tube, and have listened to his paper with much profit. We all know that a radical mastoid operation will fail of complete success in giving the patient a dry ear if the Eustachian tube remains patent, and therefore we endeavor to close it permanently at the time of the operation, sometimes successfully, and sometimes with partial or complete failure. In these cases the Yankauer operation gives us a chance to complete the cure at a later date. Following the same line of study it is evident that many of our cases of chronic suppurative otitis media, where there is not too much caries and where the mastoid is not seriously involved, may be cured by closure of the tube without resorting to the radical operation, and this is a condition very much to be desired. I have not used the Yankauer instruments, but with improvised ones have a number of times succeeded in effecting a permanent closure of the tube, and a cure of the middle-ear disease. At any rate, the Eustachian tube is of very little, if any, value where the membrana tympani has a large perforation, its only function being then that of an accessory aid to drainage. The hearing of these cases, in my experience, may be improved by operation, but is frequently made worse. A dry ear has frequently less hearing power than when it was discharging freely.

Replying to Dr. Gleason Dr. Coates said: We obtain a dry canal with perfectly leathery appearance. Owing to its toughness and elasticity it would be difficult to injure the carotid artery, even though the canal be

necrosed. No accidents have occurred in any of my cases. Dr. Allport uses a burr and engine and has never known an injury to the artery.

Hearing is tested only by speech prior to operation, after thorough cleansing and drying, and after operation. At this time little change in hearing—no diminution. In two cases, decided improvement, not the result of curetting, but from cutting adhesions of ossicles.

When drum membrane was perforated for many years, adhesion of ossicles and sound conveyed by bone and round window, and when latter obstructed by adhesions, no low notes.

Reaction following operation—swelling, discharge from ear, first thin and then muco-purulent, finally watery mucus. After weeks secretions usually disappear.

All cases had been under treatment at our own or other clinics for years. In one case of oral polyps after clearing and closing, tube became dry and has so remained. No matter what the nasal condition, colds, influenza, polyps, etc., once the tube is closed, the ear never becomes involved. They do not get immediately well—average time six months; one case not until a year longer; time depends on condition of drainage and extent of disease. If small portion of middle ear is diseased—cure rapid; if necrosis of ossicles,—then longer; if necrosis of mastoid and sequestrae,—never cured until radical mastoid operation.

Help nature by ossiculectomy, remove outer wall to favor drainage, then open antrum through external canal.

In answer to Dr. Mackenzie's question: I have never tried the infiltration anesthesia.

Submucous Resection of the Nasal Septum with Report of One Hundred Cases. HORACE T. AYNESWORTH, *Jour. Ophthal. and Oto-Laryngol.*, Feb., 1913.

The results obtained as to nasal breathing were good in every one of the series, with one or two exceptions. The tonsils and adenoids are removed subsequently if necessarily.

The tendency to catch cold was improved or done away with, as a rule. Ear affections were favorably influenced. Six cases of tuberculosis and suspects in incipient stage were operated with decided benefit in each one. Two epileptic cases were greatly benefited, the third one since died in a paroxysm.

The majority of cases having associated stomach trouble experienced relief.

STEIN.

